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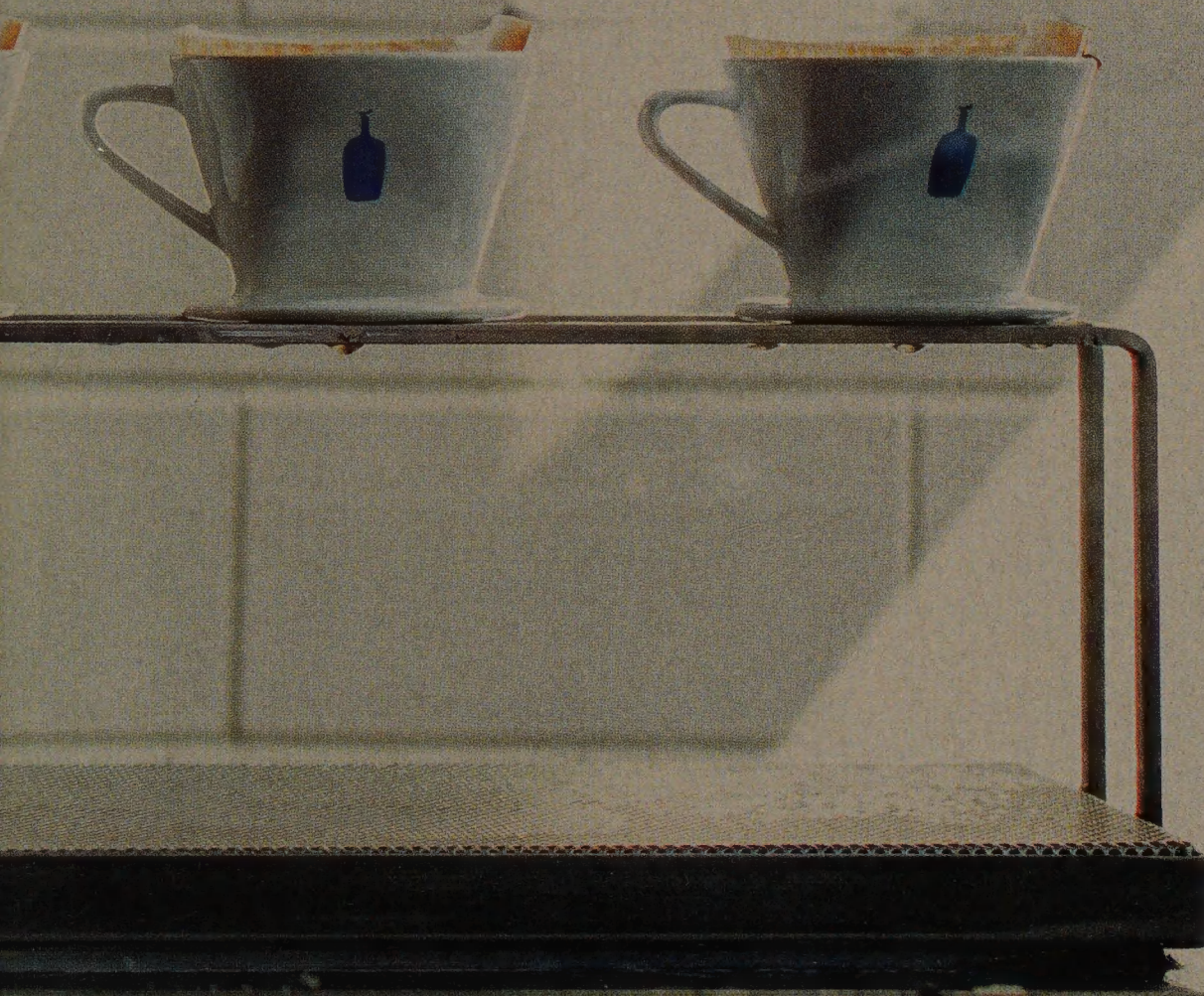
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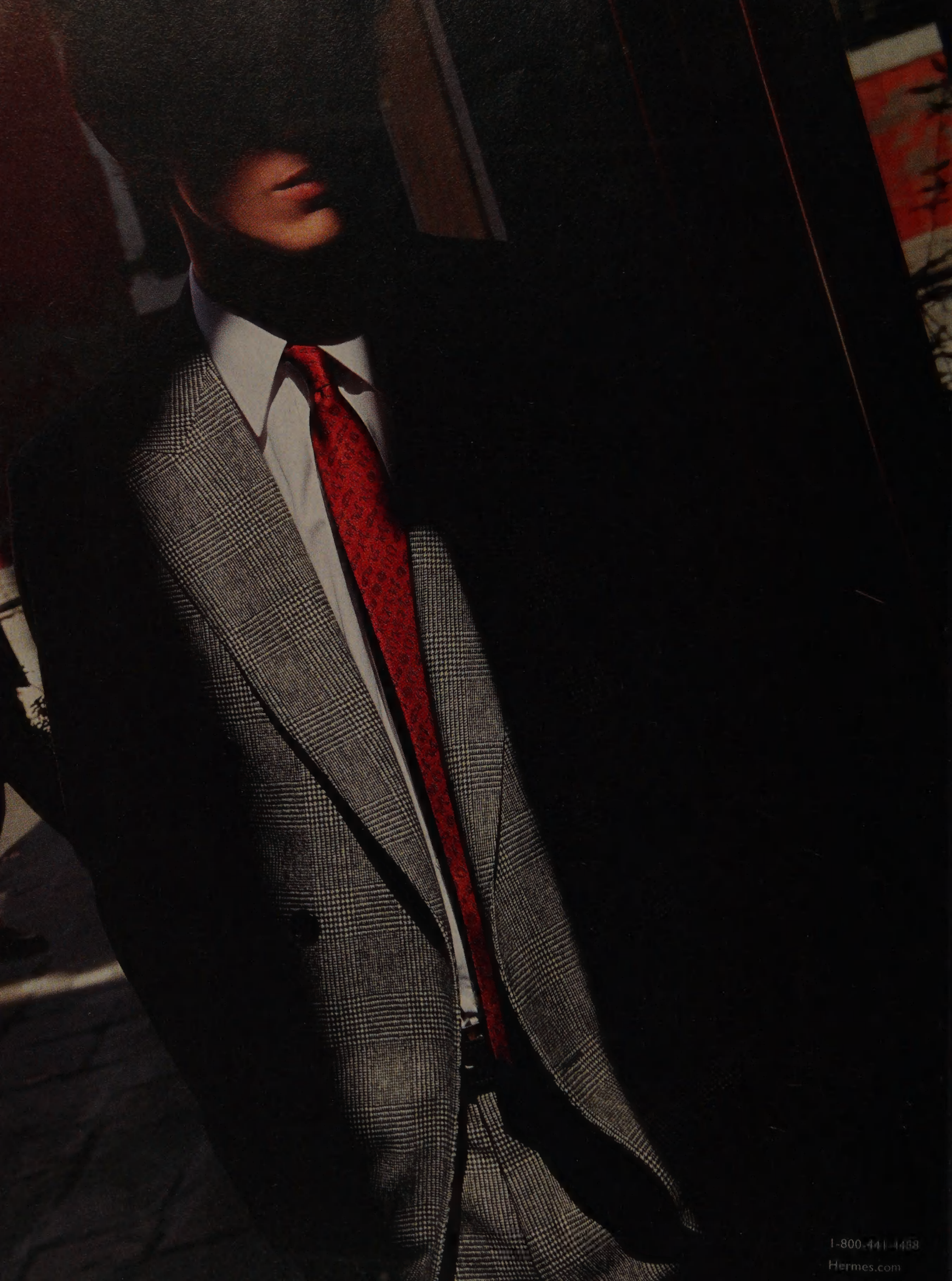
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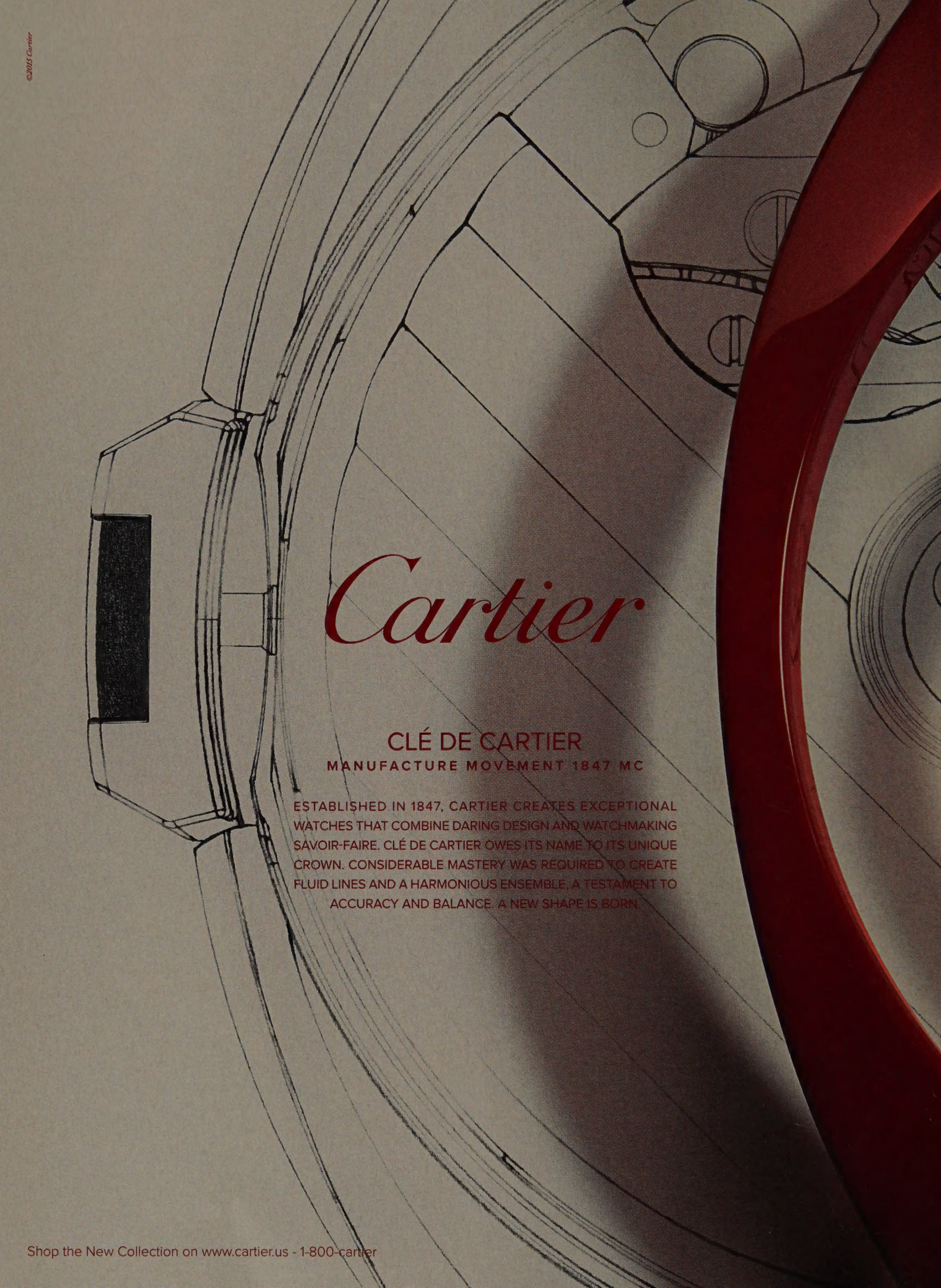
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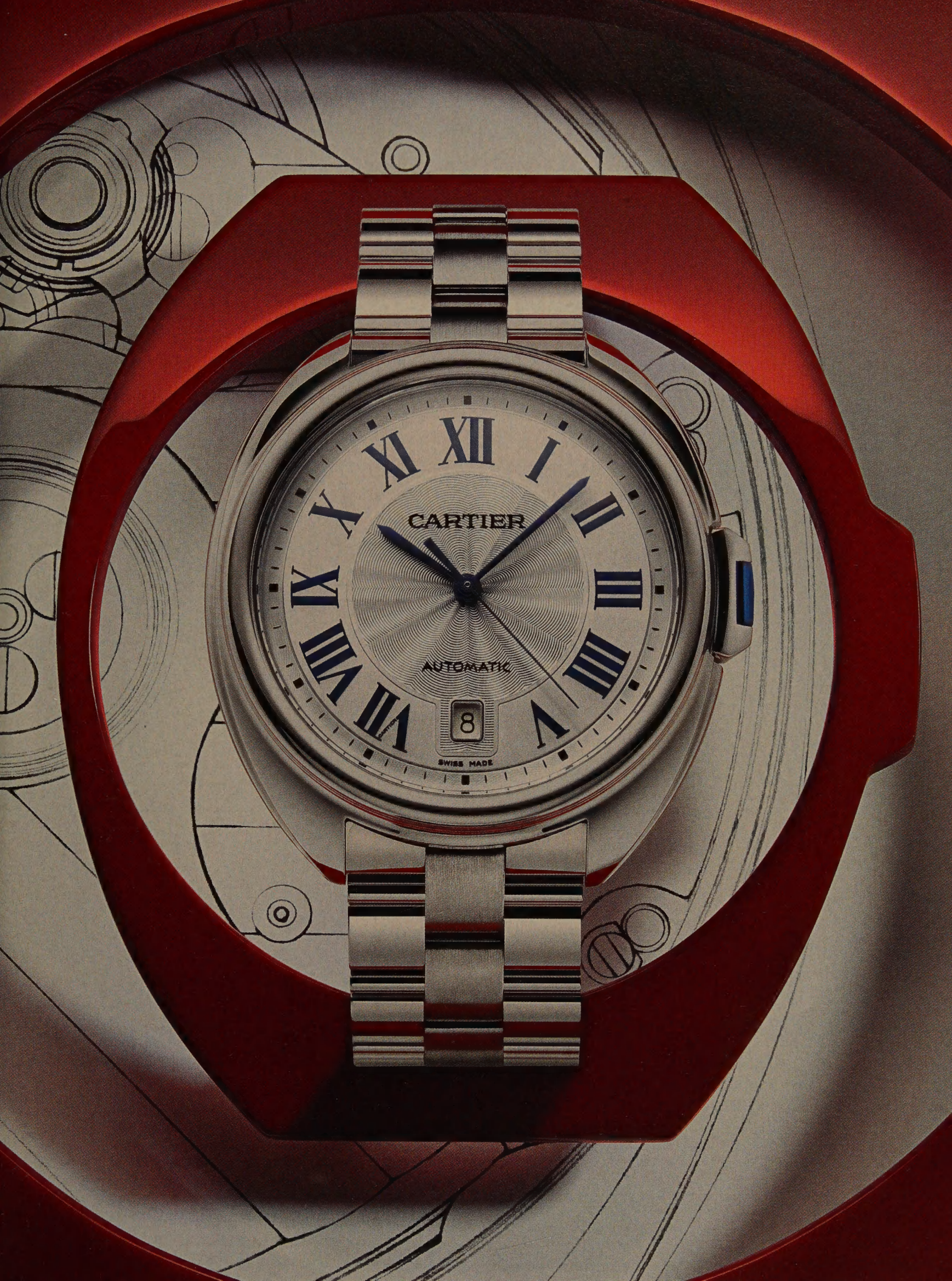

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On the cover: Photographed by Robert Trachtenberg for FORBES at Tesla in Fremont, Calif. Elon Musk wears a shirt by Calvin Klein and jacket by John Varvatos. Styled by Joseph DeAcetis. Image courtesy of Trunk Archive.

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AND NATHAN FURR

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A WATERSHED FOR WATERSHEDS.



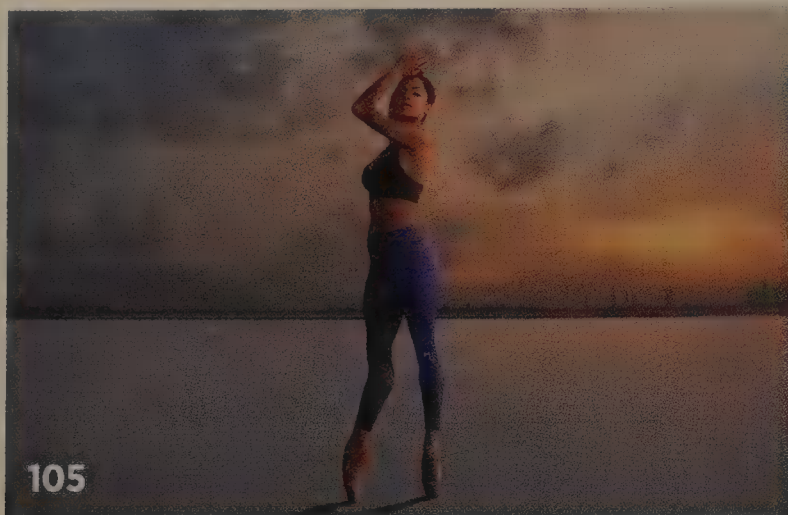
Half of the Everglades has already disappeared. Now the remaining half of this fragile ecosystem is at risk from pollutants in stormwater runoff.

The problem has been decades in the making. But the millions of Florida residents, visitors and native animals relying on this watershed don't have decades to wait for a solution. So the South Florida Water Management District designed immediate stormwater treatment wetlands and Citi found a way to finance the project in weeks rather than years. Now, clean water from these wetlands is replenishing the Everglades and an inconceivably global landmark is on the mend.

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When the X's and O's Don't Add Up

BY LEWIS D'VORKIN

I RECENTLY GAVE A TALK to a bunch of UX aficionados. They're the gnomes who fixate on user experience, or what goes where on a Web page, especially those boxy display ads that everyone disses but remain a \$10 billion-plus business. The presenter before me did John Madden proud with the X's and O's of the craft. Then I got up onstage. "That's all very nice," I said, "but let's talk reality." My point: Making money in media goes well beyond arranging banners on screens. In that spirit, here's what's occupying my time—and anyone else's trying to navigate this business.

1. The "New" Quality: It keeps changing. From thoroughness to timeliness. From facts to perspective. From dispassionate to authentic. From comprehensive to bite-size. From text to photos to videos. From words to charts to data cards. The right mix is specific to device, time of day, generation and who knows what else. Everyone's working it for ad dollars.

2. Loyalty to What and Whom: Facebook, Twitter and Snapchat are the new home pages. Visitors from each read and leave websites in seconds. The challenge: getting audiences to read, browse and stay.

3. The Monetization Mess: The newest fixation: ad blockers. Industrywide 20% of digital readers use them to knock out those hated display ads.

4. Mobile Mayhem: There's no fighting technology and consumer behavior—and both lead to mobile. That leaves journalists debating shareable nuggets vs. 800-word stories and everyone talking in hushed tones about lifeless smartphone ads and trafficless apps.

5. Millennial Madness: It's the audience segment of the moment. But what kind of marketing messages will win the day?

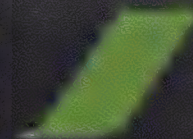
6. Scale vs. Niche: The right 5 million or the right 5,000? The game has been the former, but advertisers now want both.

7. Print Does Matter: Readers still love the medium, and marketers need to be presented with innovative ad solutions to sign up.

8. Video: Costly to produce. Hard to monetize. Success rests on distribution, which brings us all back to Facebook, Twitter and Snapchat.

I do love this business. With a portal, a startup, FORBES and billions of page views under my belt, I can see some light: innovative mobile solutions as a way to resolve some of the knotty truths. Of course, a whole new set will follow. 

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OMINOUS MOVE

CHINA'S DEVALUATION

BY STEVE FORBES, EDITOR-IN-CHIEF

CHINA'S DEVALUATION of the yuan underscores the ongoing, dangerous, growth-retarding mess of U.S. monetary policy and, indeed, the fundamental deficiency of modern economic thinking. This intellectual bankruptcy threatens the ability of economies to grow and will consequently breed more political turmoil here and around the world.

Long term, it means the dollar's days as king of all currencies will be over unless the next President knows enough to reverse the greenback's decades-old slide in value.

Some key points:

- **China's move isn't your traditional devaluation.** Rather, it's a response to the dollar's recent (but temporary) surge in value. Dollar instability wreaks havoc whether it's strengthening or weakening. A watch that can't keep accurate time is useless, whether it's too fast or too slow. On a trade-weighted basis the yuan had surged 22%, since mid-2012, before Beijing took action.
- **The dollar's strength will likely continue.** Unless the Federal Reserve changes policy on interest rates and bank regulation, bank lending won't be strong for consumers or small and new businesses. The Fed has effectively frozen bank reserves, which means that the very thing it and every other central bank ostensibly fears—deflation—will continue. The yuan, despite Beijing's reassurances, will likely experience small, continuing devaluations—the opposite of the crawling revaluation that began in the middle of the last decade. Commodities, such as oil, gold and copper, will experience more downward pressure.
- **Despite trying to compensate for the strong dollar, China's move won't be without consequences.** A number of Chinese companies and local governments in recent years have taken on dollar-denominated debt, having forgotten what happened to similar borrowers during Asia's 1997–98 economic crisis. The current upheaval will spur even more capital outflows from worried, well-to-do Chinese. The uncertainty



will hurt domestic investment by internal entrepreneurs and will cause foreign direct investment to slow. Political tensions with the U.S.—already heating up (both Democrats and Republicans are increasingly angry and upset with Beijing's growing assertiveness in claiming disputed waters and ocean real estate)—will be exacerbated.

None of this bodes well, short term, for a vigorous resumption of growth.

• **Beijing may use dollar instability to set up a yuan-centered trading and monetary bloc with some of its neighbors, especially Indonesia, to reduce U.S. influence.** The roaring greenback is increasingly wreaking currency and economic havoc in such countries as India, Indonesia, Malaysia, Thailand, South Korea and the Philippines.

Combined with Obama's slashing of U.S. military strength and his deliberate weakness vis-à-vis Iran, ISIS and Russia, the dollar turmoil gives Beijing the opening it needs to begin patching together an Asia co-prosperity sphere that would isolate Japan and freeze out the U.S. This is a recipe for deadly instability à la the 1930s.

• **If monetary policy today were a company, it would be declared insolvent.** Today's economic nomenclature think money is a tool to drive and control economic activity. That's about as accurate as saying that manipulating the way in which scales measure weight can drive down obesity levels.

Money is not wealth. It measures the value of products and services, just as scales measure weight, rulers measure length and clocks measure time. Money is a claim on goods and services. It makes buying and selling infinitely easier. Without the ability to trade with one another, we'd still be living in caves. Fixed weights and measures are essential to a smoothly functioning marketplace. So is money that has a *stable* value.

Unstable money hurts investing. After all, why take a risk if you don't know the value of the currency in which you're

going to get paid back? It shortens the investing time horizon. The longer the wait period, the more risk of chaos.

By suppressing the market price of borrowing and lending dollars, the Fed has reduced the volume of bank lending, in the same way that rent control damages the building of new apartments.

The decision of the U.S. Treasury Department and the Federal Reserve in the early part of the last decade to gradually weaken the dollar has cost the global economy billions of dollars in lost growth. The weak greenback set off a commodities boom that sucked up countless billions of dollars in investment. The thinking was that if prices were going up that could only mean we needed more of those things. But the price signals were wrong; they weren't a reflection of scarcity but of dollar weakness. This was even more glaringly evident in the false housing boom—the aftershocks of which still afflict us.

Overseas, surging commodity prices led to impressive prosperity in such countries as Brazil, Russia and South Africa. Now, however, these same countries are suffering economic contraction, which has been made worse by the strengthening dollar.

Needless to say, the roller-coastering dollar has hurt just about every nation, which is hardly conducive to sound domestic politics or constructive global behavior. It provides fuel for 1930s-style currency wars and protectionism.

Will China Boom Again?

Is China losing its mojo? Some see its currency devaluation as an anxious effort to stimulate exports and boost lagging economic growth rather than as a defensive response to the surging dollar. Other worrisome moves:

▪ **Beijing's pending strike against online financial services.** At the apparent behest of the country's powerful state-owned banks, the Bank of China is readying rules that would severely

restrict third-party online payments, dealing a severe blow to such online sellers as Alibaba and Tencent. The real target? These and other companies' online financial services. Alipay, a part of Alibaba, has a money market fund with almost \$100 billion in assets. An online banking system has been rapidly evolving that can more and more effectively and more cheaply serve consumers and small businesses.

Most of China's 40 million-plus nongovernment-owned enterprises are ignored or ill-served by China's mammoth legacy banks. Online retailers, in contrast, have a wealth of information about the creditworthiness of hundreds of millions of people and tens of millions of small businesses that mostly reside in a legal and banking twilight zone. These firms usually have to pay exorbitant interest rates from "shadow" lenders. Thanks to high tech, a financial system to meet their needs has burst upon the scene almost overnight. Consumer lending services are arising, too.

Incumbent big banks aren't happy. Online services, under the rules being foisted on them by the big banks, will be crippled. There is one exception: the online services offered by the big banks! If regulators follow through on these proposals (see Gordon Chang's alarming piece on Forbes.com), China will have delivered itself a major economic blow.

As Rich Karlgaard observes on page 40, it's the millions of nonstate-owned companies that make up most of the economy *and* an even greater proportion of China's growth and dynamism. Their profitability also far exceeds government-favored firms.

▪ **The curse of Keynes.** In response to the 2008–09 economic crisis Beijing went on a stimulus binge, which, proportionately, made President Obama look like Scrooge. The splurge of construction spending, funneled primarily through the banking system, kept China's GDP humming, but a huge amount of this capital was wasted on at least ten major ghost cit-

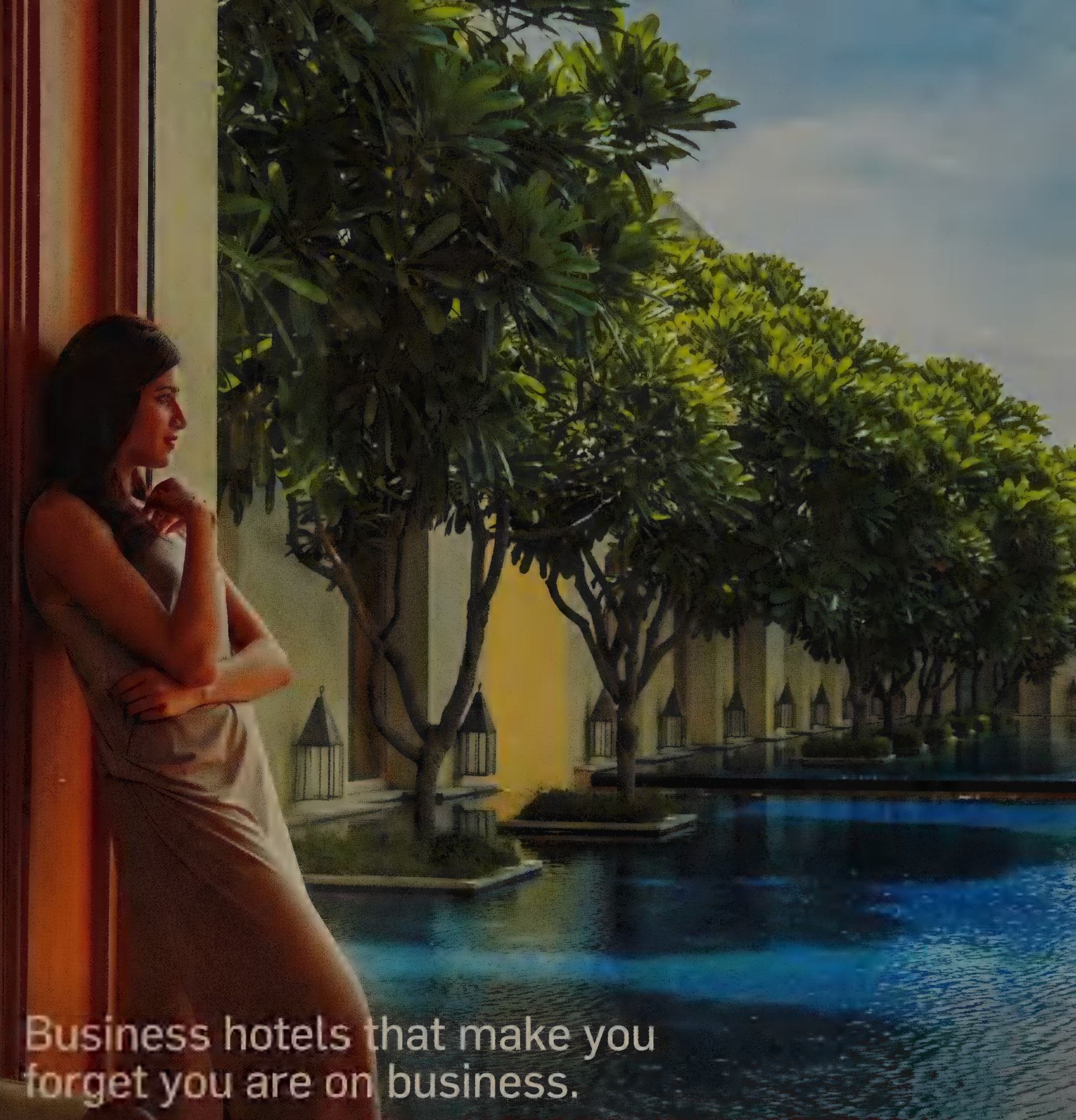
ies and other white elephants. Overall indebtedness in the country exploded.

Contrary to Keynes, who thought make-work was great, capital wasted at government's behest doesn't create a strong economy, and China is now paying the price.

▪ **This blunder led to others.** Beijing actively stoked the recent stock market boom, which went spectacularly bust. This, in turn, led the bewildered government to freeze much of the market. The original theory here—one worthy of American economists like Ben Bernanke and Janet Yellen—was that rising stocks would encourage companies to sell equity to redress their debt-heavy balance sheets. The bigger response was massive borrowing to buy stocks.

The current regime strikes some observers as once again favoring state-owned or politically well-connected companies, thereby falling into the kind of statism that ultimately stultifies an economy. Also creating uncertainty is a major anticorruption drive that many see as a political purge, which is upsetting assumptions that have governed political behavior for a couple of decades.

So is China headed for a Japanlike era of economic stagnation? Not likely, and the reason is the survival of the Communist regime. A prolonged slowdown would be politically catastrophic for the Party; the economic boom that has existed since 1978 is what gives the regime its legitimacy. Sooner rather than later, President Xi will have to push reforms on the scale of those China experienced in the mid-1990s. These will have to include major tax cuts and simplification (neighboring Hong Kong's flat tax system provides the model), pulling back any boneheaded restrictions on the rise of online financial services, easing the process of starting a legal business (China's involves 11 procedures) and pushing harder—and more consistently—to liberalize capital markets. Then those overlooked small businesses will once again make China an economic juggernaut. 



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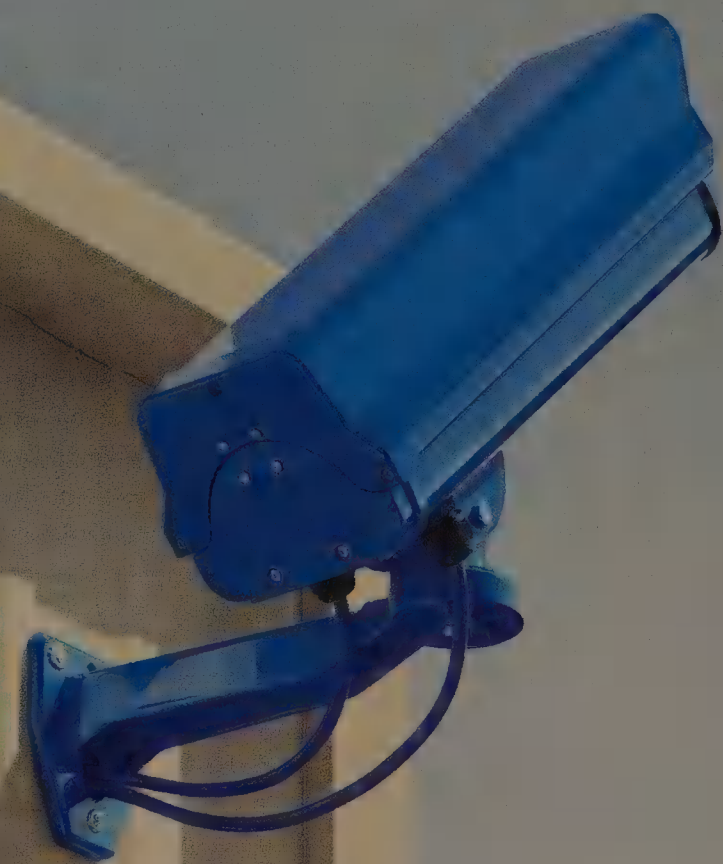
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LeaderBoard

September 7, 2015

Arch deluxe: the ironwood-and-stone entrance to Starbucks founder and CEO Howard Schultz's \$25 million new home in Hawaii's exclusive Four Seasons Hualalai development.

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(Trash can be converted into useful energy. Opportunity?)



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SPORTSMONEY

The World's Most Valuable Teams

THESE ARE boom times for pro sports owners as they capitalize on their greatest financial advantage: DVR-proof appointment television in a fractured broadcast market. As such, franchises around the globe are awash in cash thanks to multibillion-dollar media deals.

The world's 50 most valuable teams are now worth an average \$1.75 billion, up 31% from just last year. The minimum valuation to make the cut is \$1.15 billion (versus \$856 million a year ago), thanks largely to the soaring worth of NBA and Major League Baseball teams. The top 50 include 22 MLB and hoops franchises, compared with 10 in 2014.

The NFL and MLB might be hot right now, but the world's most valuable team still resides in Spain. Real Madrid ranks first for the third straight year at \$3.26 billion, edging out the Dallas Cowboys and New York Yankees, tied for second at \$3.2 billion. (The value of the Spanish soccer powerhouse is down 5%, however, due to the decline of the euro against the dollar.) For more, see forbes.com/most-valuable-teams.

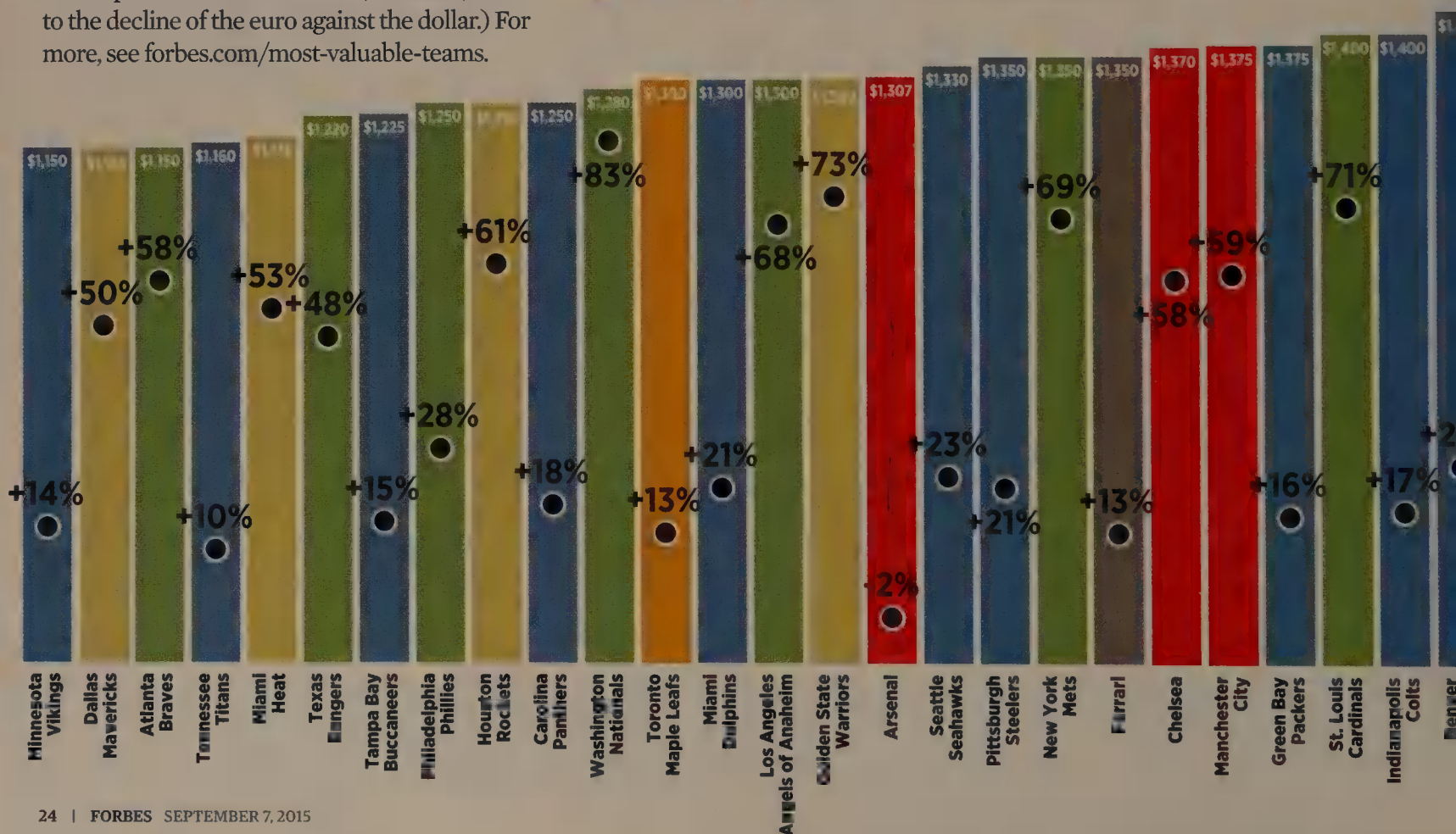
#5 United's record-shattering \$1.1 billion ten-year dual licensing deal with Adidas kicks off with the 2015-16 season.



#37 The Maple Leafs have been the NHL's most valuable franchise for nine straight years.

Team Values (\$mil)

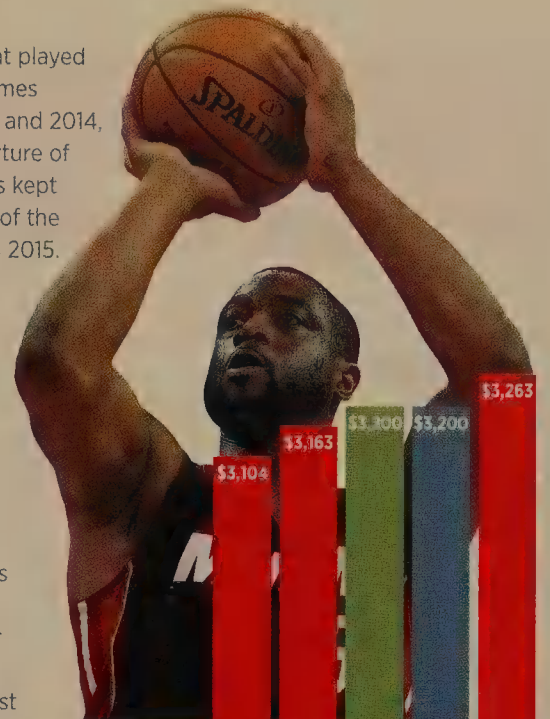
■ BASEBALL ■ BASKETBALL ■ FOOTBALL ■ FORMULA ONE
■ HOCKEY ■ SOCCER ● 1-YEAR CHANGE (%)



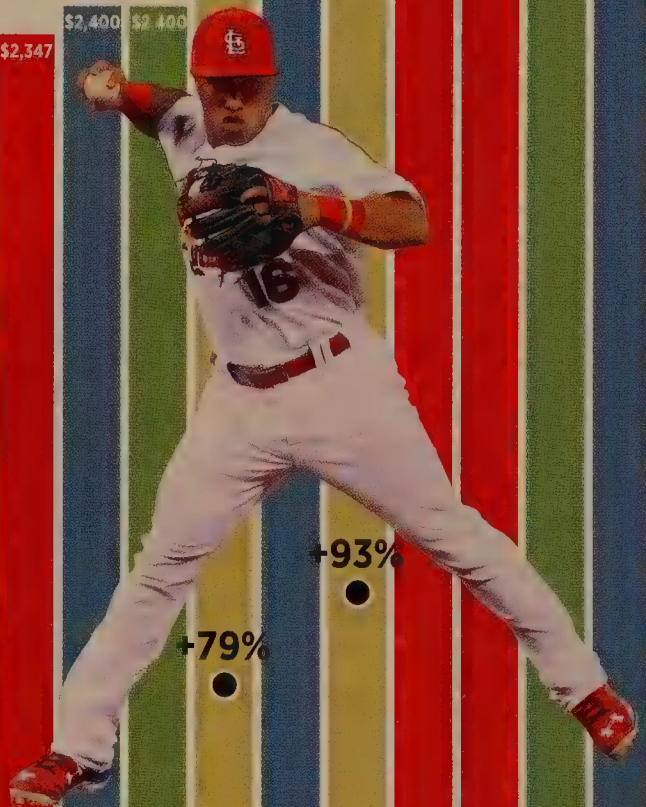
#14 The Bulls led the NBA in attendance last season for the sixth straight year, averaging 21,343 fans per game.



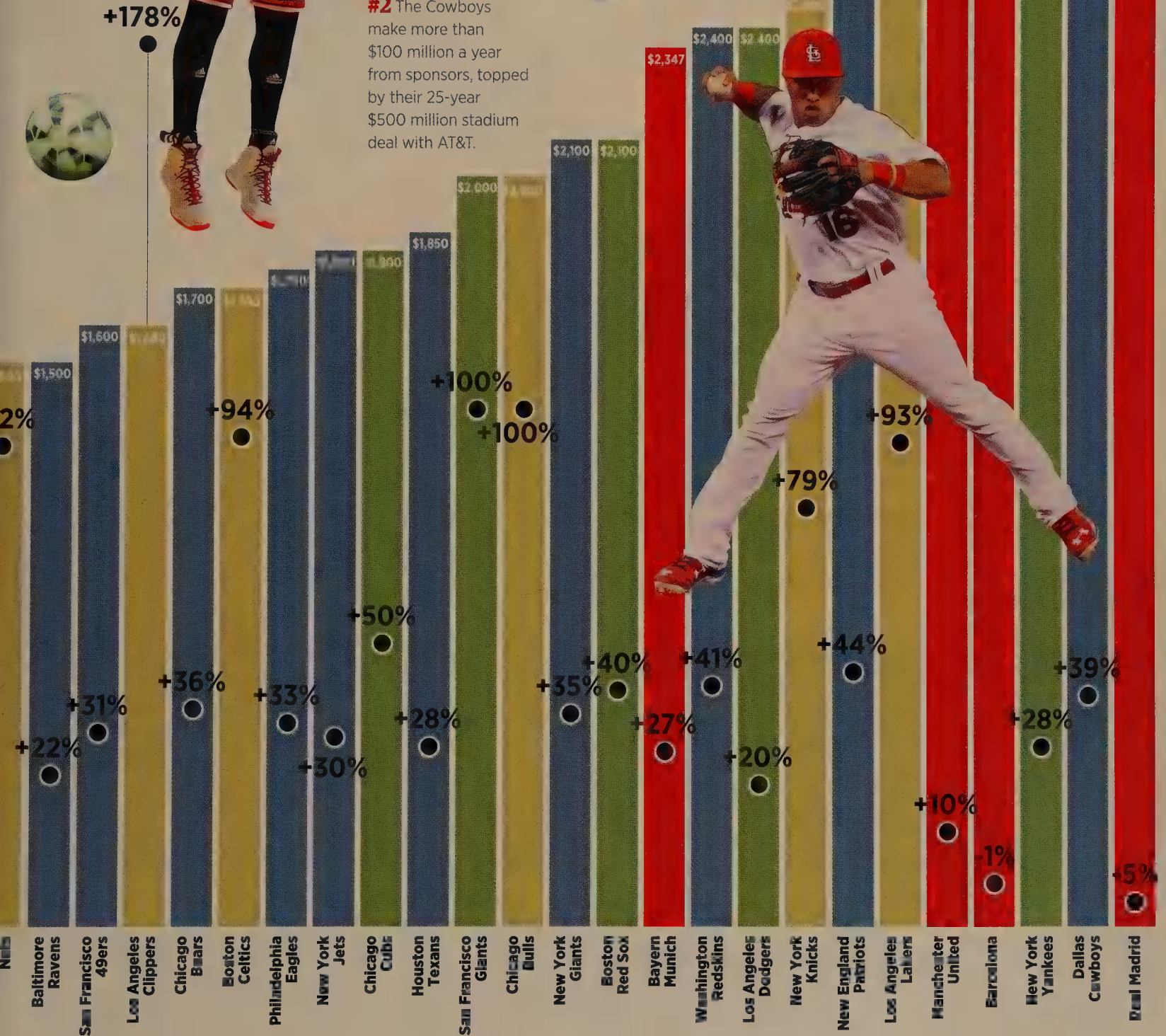
#47 The Heat played 87 playoff games between 2011 and 2014, but the departure of LeBron James kept the team out of the postseason in 2015.



#27 The Cardinals have had only one losing season over the past 15 years and had the highest local TV ratings in baseball in 2014.



#2 The Cowboys make more than \$100 million a year from sponsors, topped by their 25-year \$500 million stadium deal with AT&T.



TRAVERSING THE
LANDSCAPE OF

BIG DATA

THE SURVEY

More than 300 senior data and analytics pros from the world's top firms.

THE LEADERS

The top survey takers say big data is transformational, efforts are "best of breed," and impacts are reflected in the bottom line.

C-SUITE SUPPORT

Firms with C-suite support are showing the biggest gains, but chiefs in the West are lagging behind those across Asia Pacific.

IS BIG DATA A TOP 5 ISSUE ON THE CXO AGENDA?

NORTH AMERICA

49%

WESTERN EUROPE

55%

ASIA PACIFIC

83%

INVESTMENT

Leaders are making "very significant investments" to build capacity and increase scalability.

ANALYTICS TECHNOLOGY

64%

ANALYTICS TALENT

68%

DATA AND STORAGE TECHNOLOGY

75%

DATA ACQUISITION

82%

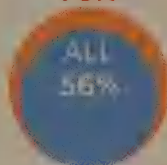
THE RIGHT DATA

Leaders are as likely to use established sources, such as text and sensor, but are far more likely to collect data from new sources like social media and video.

WHAT SOURCES OF BIG DATA ARE YOU CURRENTLY USING?

LEADERS

75%



LOCATION

75%



SOCIAL

75%



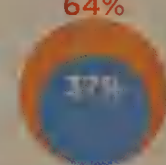
IMAGES

71%



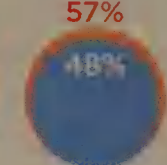
WEBLOGS

64%



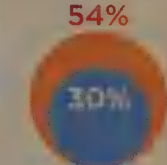
VIDEOS

57%



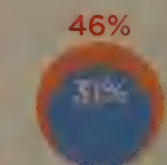
TEXT

54%



AUDIO

46%



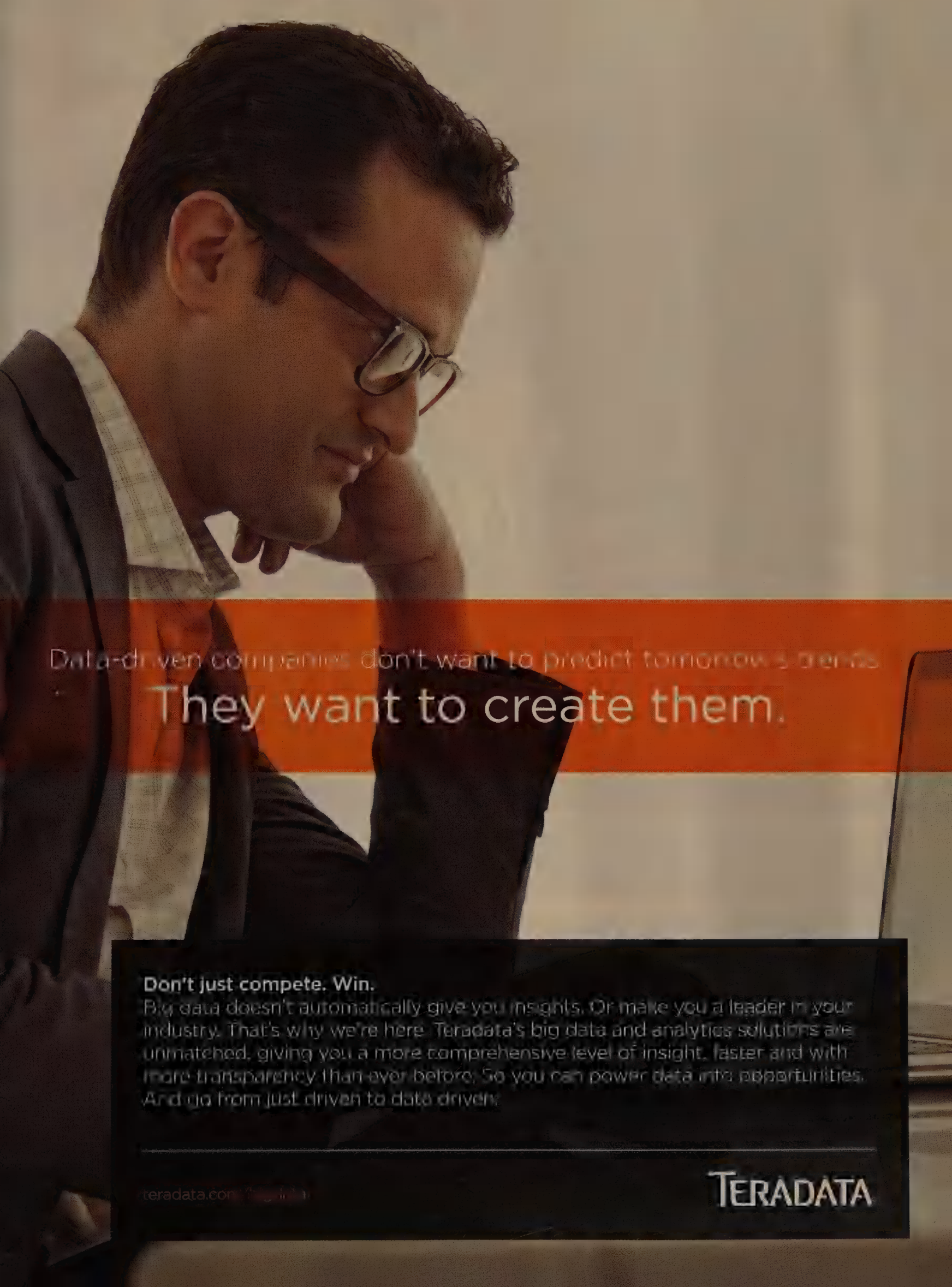
SENSOR

TERADATA

Forbes
INSIGHTS

This exclusive visualization normalizes survey responses to form a terrain describing today's data and analytics landscape. Survey instrument designed by Forbes Insights and McKinsey in partnership with Teradata.

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TERADATA

LeaderBoard

MARY ALICE DORRANCE MALONE

+\$150 MILLION

NET WORTH: \$3.5 BILLION

Campbell Soup heiress sees her shares climb 6% thanks to the company's new recipe: more organics, fewer additives and (especially) better margins.



HOLLYWOOD POWER BROKERS

Titans of Tinseltown

MOVIE STARS get all the glory, but those whose fame is largely off-camera command even bigger fortunes. These are the ten wealthiest moguls, with at least 60% of their net worth tied to their entertainment ventures. Roll the footage.

1. Rupert Murdoch 21ST CENTURY FOX

(\$12.5 BILLION) Film division had a great 2014, with bottle box office at \$5.5 billion and a Best Picture Oscar for *Birdman*.

2. Sumner Redstone VIACOM

(\$5.2 BILLION) The 82-year-old still stays at the helm of his MTV, Nickelodeon and Comedy Central.

3. George Lucas LUCASFILM

(\$5.1 BILLION) Soloist Film company is looking for a billion in 2015; consulted on upcoming *Star Wars* installment.

4. Isaac Perlmutter MARVEL

(\$4 BILLION) Scored huge with *Iron Man* and *X-Men*, though this summer's *Fantastic Four* was a downer.

5. Steven Spielberg DREAMWORKS

(\$3.6 BILLION) Directed the crowd-pleasing *Jurassic World* reboot; directed this fall's hotly anticipated Cold War flick *Bridge of Spies*.

6. Haim Saban UNIVISION

(\$3.5 BILLION) Chairs the top Spanish-language TV network, for which an IPO is likely this autumn.

7. Oprah Winfrey OWN/HARPO

(\$3 BILLION) Cable network OWN enjoys soaring ratings; film imprint Harpo coproduced critical darling *Selma*.

8. Reed Hastings NETFLIX

(\$1.6 BILLION) Running rings around cable with streaming video and original hits, including *House of Cards*.

9. Brian Roberts COMCAST

(\$1.4 BILLION) Assets include Universal Pictures, NBC News and Sports, Telemundo and theme parks.

10. Thomas Tull LEGENDARY PICTURES

(\$1 BILLION) See below.



NEW BILLIONAIRES

Ten-Figure Action Hero

Movie producer Thomas Tull's skyrocketing net worth gets two thumbs up.

WHEN JURASSIC WORLD rampaged to a record \$209 million opening weekend in July, one of the biggest beneficiaries was its 45-year-old coexecutive producer, Thomas Tull. Founder and CEO of Legendary Pictures, Tull had a hand in the *Dark Knight* trilogy, the *Hangover* series, *Interstellar* and *Godzilla*. Their success has helped push Legendary's valuation above \$3.5 billion and Tull's net worth to \$1 billion.

Tull was born in Binghamton, N.Y. and raised in modest circumstances by a single mother. After college he started a chain of laundromats and later bought several tax-preparation businesses before heading to a venture capital firm in North Carolina. In 2001 he landed a gig at the Convex Group, an Atlanta-based media-content distribution firm, eventually becoming its president.

In 2004 he raised \$600 million from Wall Street investors and in 2005 headed to Hollywood, where he inked an eight-year financing and production deal with Warner Bros. that spanned more than 30 movies, including *Inception* and *Pacific Rim*. In 2013 Legendary announced a new deal with Universal Pictures; the biopic *Steve Jobs* is among its upcoming releases.

THOMAS TULL: KEVIN WINTER/GETTY IMAGES (RIGHT); KEN JAMES/BLOOMBERG (TOP); ILLUSTRATION BY JOHN UELAND FOR FORBES
ALL FIGURES AT THE TOP OF THIS AND SUBSEQUENT PAGES REPRESENT CHANGES IN WEALTH BETWEEN JULY 21 AND AUG. 11.
SOURCES: INTERACTIVE DATA VIA FACTSET RESEARCH SYSTEMS; FORBES.
NEW BILLIONAIRES BY CHASE PETERSON-WITHORN



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With 200+ hotels, we're everywhere you want to be. With modern, classic design and always approachable service, we offer what matters most to keep you comfortable and connected. **This is Four Points.**

FOURPOINTS.COM



7:05 am
Put on workout clothes in the room.

8:00 am
Cab it to a meeting. Take a conference call on the way.



4:10 pm
Deal done, Pregame check-in.



6:15 pm
Meet the team for dinner.



7:40 pm
Kick back, relax with beers and the game.



LeaderBoard

VINCE MCMAHON

+\$140 MILLION

NET WORTH: \$1.1 BILLION

Wrestling king is a billionaire once more. His WWE shares climb 26% following good subscriber tallies for his live-streaming online network.



REAL ESTATE



Make it a year! The house is... The infinity pool faces... the property is... with... of the...

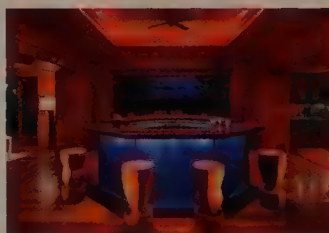
Coffee House

Howard Schultz scores a scalding-hot property on Hawaii's Big Island.

STARBUCKS' BILLIONAIRE CEO has closed on a \$25 million eight-bedroom home in the Four Seasons development in Hawaii's Hualalai resort area. The 1.8-acre property hit the market in January for \$33 million; the seller was William Jahnke, former head of Wells Fargo Investment Advisors.

As first reported exclusively on Forbes.com, Schultz's new abode has 10,641 square feet of living space and stretches over two lots. Located at the edge of one of Hualalai's two golf courses, it has a series of ironwood bridges over a man-made lagoon; the effect is that of a house floating on water. It boasts views of Maui in the distance; the great room, kitchen, dining room and master suite face the Haleakala volcano to the north. The entire structure is wood, with a teak exterior and no Sheetrock whatsoever.

Most amazing: It isn't even in Hawaii's most exclusive locale. That's Kukio, directly south, where billionaires such as Schultz's friend Michael Dell, hedge funder Ken Griffin, investor Howard Marks and KKR's George Roberts (as well as Warren Buffett's sister, Bertie) command prime lots and prices edge up to \$70 million.



HAROLD CLARKE OF LUXURY BIG ISLAND REPRESENTED BOTH THE BUYER AND THE SELLER.

time
spent in
airports



quality
time

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THE ONLY CARD TO OFFER: United ClubSM Membership | 2 Free Checked Bags¹
Premier Access[®] | 1.5 Miles Per \$1 On Every Purchase

Annual fee \$450². Apply now and get a \$100 statement credit after first purchase.



To apply, visit MileagePlusClub.com

¹**Free Checked Bag:** Free bags are for first and second standard checked bags for the primary cardmember and one companion traveling on the same reservation. Service charges for additional checked bags and overweight bags may apply. Purchase of tickets with Card is required. See united.com/chaseban for details. ²**Pricing:** Purchase and balance transfer APR is 15.99% variable. Cash advances and overdraft advances APR is 24.99% variable. Variable APRs change with the market based on the Prime Rate, which was 3.25% on 5/18/15. Annual fee: \$450. Minimum Interest Charge: None. Balance Transfer Fee: 3% of the amount of each transaction, but not less than \$5. Note: This account may not be eligible for balance transfers. Cash Advance Fee: 5% of the amount of each advance, but not less than \$10. Foreign Transaction Fee: None. Cards issued and issued by Chase Bank N.A. Subject to credit approval. To obtain additional information on the current terms and information on any changes to these terms, visit the MileagePlus website at MileagePlusClub.com. You must have a valid permanent home address within the 50 United States or the District of Columbia. Restrictions and limitations apply. Offer subject to change. See MileagePlusClub.com for mileage and rewards details. MileagePlus Miles earned, awards, and benefits issued are subject to the rules of the United MileagePlus program. For details, see united.com.

Authorities reportedly seize a \$28 million painting from the Spanish banker's yacht, contending that he was trying to sell a national treasure abroad; he denies it.



LeaderBoard

METROS

Best Places for Business

WHERE ARE AMERICA'S El Dorados? We've ranked the country's 200 largest metropolitan areas for quality of life, business friendliness and a host of other economic and lifestyle measures to produce our 17th annual list of the Best Places for Business and Careers. (The complete rankings and methodology can be found at forbes.com/best-places-for-business.)

At the pinnacle: Denver, up from No. 4 last year. The Denver-Aurora-Lakewood metro area, home to 2.8 million people, is attractive for its diverse economy, highly educated workforce and plentiful outdoor-recreation choices. Lockheed Martin recently relocated the headquarters of its commercial space operations to its Mile High campus; the \$46 billion (sales) aerospace and defense contractor now has more than 4,500 employees in the city. The worst metro? Atlantic City, N.J. High costs, poor overall education ... and all those shuttered casinos.

1.

DENVER

Job growth last five years of 2.3%; U.S. average is 1.3%.

2.

RALEIGH, N.C.

Last year's No. 1 drops a notch, but in-migration remains robust.

3.

PORTLAND, ORE.

Three-year projected annual economic growth is 7.3%, the second-highest forecast rate in the U.S.

4.

PROVO, UTAH

Business costs 18% lower than U.S. average, helping Provo boast U.S.' second-highest job growth rate the last five years.

5.

ATLANTA

Rising nine spots from last year's ranking, Georgia's capital boasts the seventh-largest economy in the U.S.



6.

SEATTLE

Economy on a tear; high business and living costs prevent it from ranking higher.

7.

SALT LAKE CITY

Unemployment rate will likely average a scant 3.1% for 2015, according to Moody's Analytics.

8.

INDIANAPOLIS

Improved employment and economic outlook gives Indy a boost of 14 places over 2014.

9.

WARREN, MICH.

Job growth in this area just north of Detroit has averaged 2.4% for five years, 12th best in the U.S. among the larger metro areas.

10.

FORT COLLINS, COLO.

Ninety-five percent of residents have a high school diploma, the third-highest rate in the U.S.

BY THE NUMBERS



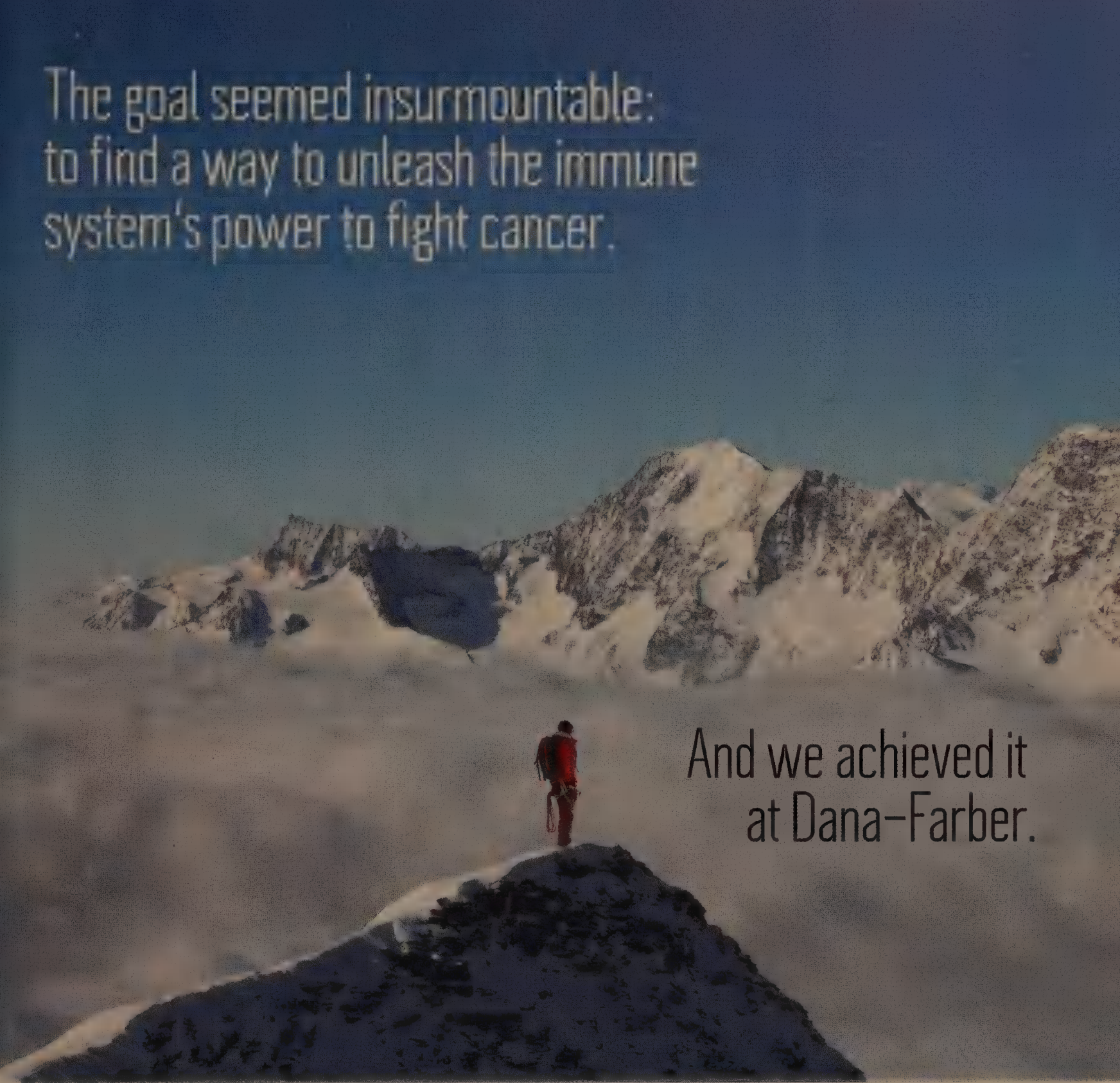
Variable Winds

TEN YEARS after Hurricane Katrina, how's New Orleans doing? Better but not great, according to the metrics we use for our annual Best Places for Business list. Overall NOLA is smaller, safer, more expensive, a bit better educated and somewhat more business-friendly. Yet, despite more than \$160 billion in federal aid and insurance payouts to the broader Gulf region, the Crescent City's economy is very much a mixed bag.

2004	2015
POPULATION (METRO AREA)	
1,376,828	1,253,285
BEST CITIES FOR BUSINESS RANK	
108	98
BUSINESS COSTS (U.S.=100)/RANK	
92.2/31	89/58
5-YEAR JOB GROWTH %/RANK	
-0.2%/117	1.1%/90
HIGH-TECH EMPLOYMENT	
14.1%	11.6%
5-YEAR INCOME GROWTH %/RANK	
2.5%/68	0.1%/179
MEDIAN HOME PRICE	
\$129,970	\$168,000
HOUSING AFFORDABILITY INDEX	
156	174
CRIMES PER 100,000 RESIDENTS	
5,180	3,735
COLLEGE ATTAINMENT %/RANK	
22.6%/97	27.4%/118
PH.D.'S PER 100,000 RESIDENTS	
546	905

SOURCES: MOODY'S ANALYTICS; U.S. CENSUS BUREAU; FORBES

The goal seemed insurmountable:
to find a way to unleash the immune
system's power to fight cancer.



And we achieved it
at Dana-Farber.

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Videos, whitepapers and more at DiscoverCareBelieve.org/PD-1



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL



DANA-FARBER
CANCER INSTITUTE

Discover Care. Believe.

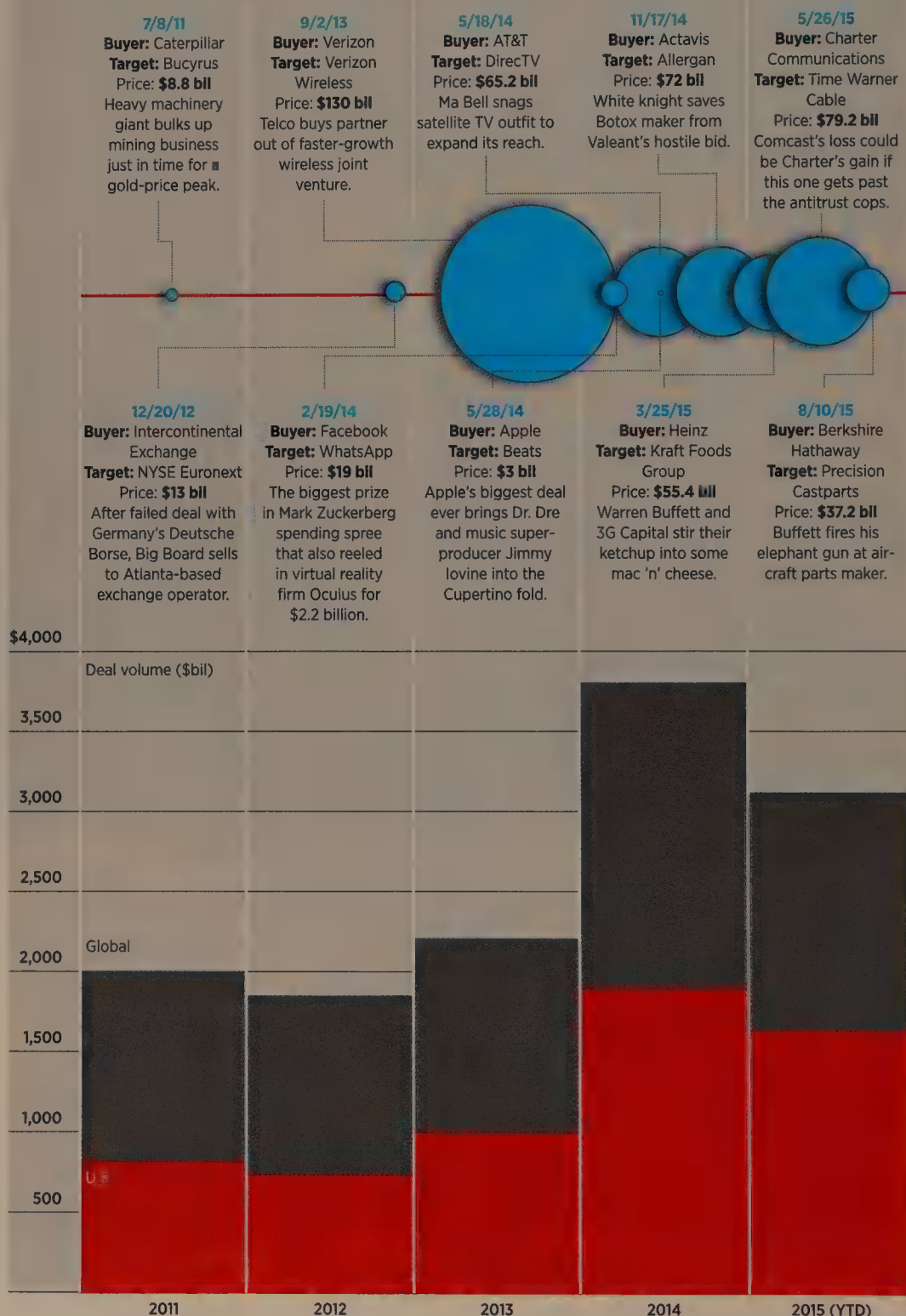
© 2015 Dana-Farber Cancer Institute

LeaderBoard

TRENDLINE

Buyer's Market

THE EQUITIES BULL might be looking a little long in the tooth, but recent weakness in U.S. stocks hasn't dampened the ardor for corporate dealmaking. Berkshire Hathaway is in the thick of things with its August announcement of a \$37 billion buy of aerospace components maker Precision Castparts, and Warren Buffett isn't the only one who's been cutting big checks during the M&A boom of the last five years. A look at some of the most notable:



ROBIN LI
-\$2.5 BILLION

NET WORTH: \$12.8 BILLION
Baidu shares plummet 15% in a day after the Chinese Internet search company admits its expenses are ballooning and its margins deflating.



30 UNDER 30

Inventors

Breaking new ground with the Forbes 30 Under 30, in 30 words or less.



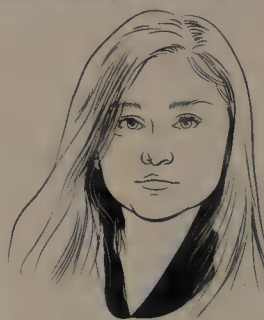
Antoine Balaesque, Henry Bradlow

LILY ROBOTICS | 24, ■

The UC Berkeley duo created the world's first autonomous flying camera, hitting the market in 2016. Toss the Lily Camera into the air and it follows, taking stills and video.

Elizabeth Beattie Hunter

UPENN SCHOOL OF ENGINEERING & APPLIED SCIENCE | 14

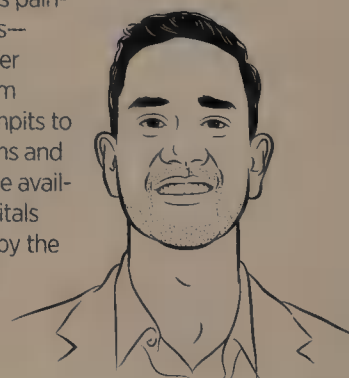


Robotist Hunter first designed the Titan Arm, which amps the wearer's biceps strength by 40 pounds, and is now working on microrobots half the width of a human hair.

Partha Unnava

BETTER WALK | 22

Better Walk's pain-free crutches—which transfer pressure from patients' armpits to their forearms and sides—will be available in hospitals nationwide by the end of 2016.



The background of the advertisement is a complex, abstract geometric pattern. It features a network of thin, dark lines connecting various points. These points are represented by small, solid-colored circles in shades of blue, green, and red. Interspersed among these are small, hollow squares and diamonds. Two prominent circular motifs are visible: one on the left and one on the right, each consisting of a central point with numerous lines radiating outwards to a ring of smaller points, resembling a stylized sunburst or a molecular structure. The overall composition is dynamic and suggests a sense of movement and interconnectedness.

The future belongs to the fast.



IT strategy is now business strategy.

In a changing landscape, every company faces the challenge of quickly moving from what they are now to what they need to become. This has made IT solutions that can accelerate change the single most important strategic weapon for business. HP believes that when people, technology and ideas all come together, business can move further, faster. To find out more, visit us at hp.com/furtherfaster.

LAURENE POWELL JOBS
-\$2.1 BILLION

NET WORTH: \$20.2 BILLION

Steve Jobs' widow loses \$670 million as iPhone sales in China lag and another \$1.5 billion when shares in Pixar parent Disney fall.



LeaderBoard

FIRST WORLD PROBLEMS

No Good Startup Names Left

IN MID-AUGUST Google announced it was reorganizing itself under an umbrella company to be called Alphabet. Pardon us for asking, but are world-beating multinationals now outsourcing their name selection to first graders?

They aren't, actually—the problem, it seems, is that all the good names are already taken. And if Google can't come up with a decent—or at least meaningful—name for itself, what hope does the average startup have? The unfortunate result: a spate of mealy-mouthed mash-ups with no relevance to what the company does (home services site Zaarly, we're looking at you). Can you tell which of the following startup names are real and which are fake? Answers are at the bottom of the page.

STARTUP: REAL OR FAKE?



1. SPAREFOOT

Like Hotels.com but for storage units.

☐ Real ☐ Fake



2. FIESTIFY

On-demand mariachi band.

☐ Real ☐ Fake



3. BARKBUDDY

Tinder for dogs.

☐ Real ☐ Fake



4. AVIATO

Airline booking aggregator.

☐ Real ☐ Fake



5. INEEDTREEZ

Alibaba but for legal marijuana.

☐ Real ☐ Fake



6. ISLUMPED

Website for expressing personal failures.

☐ Real ☐ Fake



7. SNAIL MAIL

Escargot delivery service.

☐ Real ☐ Fake



8. JOOMLA

Open-source content-management system.

☐ Real ☐ Fake



RICHEST BY STATE

Colorado

POPULATION:

5.4 MILLION

GROSS STATE PRODUCT:

\$279.7 BILLION

(4.7% GROWTH YEAR-ON-YEAR)

GSP PER CAPITA:

\$52,214

(RANKS NO. 16 NATIONWIDE)

RICHEST:

CHARLES ERGEN

\$18.2 BILLION

(NO. 26 ON THE FORBES 400)

SATELLITE SULTAN Charles Ergen, the co-founder, chairman and CEO of Dish Network, has more than just competition from a ravenous Netflix to think about these days. In July Dish and Ergen personally were sued by Philip Falcone (a former billionaire himself) and his hedge fund, Harbinger Capital.

Falcone seeks \$1.5 billion in damages, alleging that Dish and EchoStar (a satellite operator also chaired by Ergen) fraudulently plotted to strip Harbinger of its equity in troubled wireless company LightSquared, which exited bankruptcy in March, so Ergen could acquire its wireless-spectrum assets at "fire-sale prices." Ergen and the companies have yet to respond to the claims.

Ergen, 62, got his start as a professional gambler in the 1970s. Reportedly banned from a number of casinos, Ergen and his friend James DeFranco, along with Ergen's wife, Candy, began selling satellite dishes. They founded EchoStar in 1980; Dish followed in 1996. Ergen was Dish's CEO until 2011, when he stepped down but remained chairman; this March he resumed the role of chief executive at the \$14.6 billion (revenues) company when then CEO Joseph Clayton retired.

Ergen earned his M.B.A. from Wake Forest. An avid mountaineer, he has climbed many of Colorado's peaks and both Kilimanjaro and Everest.

ANSWERS:
 1. Real; 2. Fake; 3. Real; 4. Fake—but it is a startup on HBO's Silicon Valley; 5. Real; 6. Real; 7. Fake; 8. Real



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LeaderBoard

SEAL THE DEAL

A Taste of Havana

NOTHING FOLLOWS a celebratory handshake quite like a good cigar. And the moment the deal's done, you should be filling that empty hand with a choice smoke from Cuba. The decades-long embargo has essentially been lifted; you can now legally bring \$100 worth of Cuban tobacco into the U.S., and that amount will surely increase in the years ahead.

From the abbreviated Romeo y Julieta Short Churchill to the limited-edition Cohiba Robusto Supremos, each is rolled to please from tip to foot. The iconic torpedo-shaped

Montecristo No. 2 should last a full power lunch to savor in its entirety, but if it's a fleeting pleasure you seek, consider the Partagas Serie D No. 5. The historically infused will be drawn to the H.U. Upmann Connoisseur A. The Upmann brand was JFK's choice, and in February 1962 he asked his press secretary, Pierre Salinger, to procure at least 1,000 for the White House overnight. The next day, once 1,200 of the President's favorite Cuban cigars were safely in the White House, Kennedy signed the embargo, making them illegal for the next half-century.



From left:
H. Upmann
Connoisseur A
\$100 (1975) Romeo
y Julieta Short
Churchill (814)
Partagas Serie D
No. 5 (1975) Cohiba
Robusto Supremos
\$100 (1975) Bolívar
\$100 (1975) Bolívar
\$100 (1975) Bolívar
\$100 (1975) Bolívar

* Estimated U.S. dollar prices in Cuba.

JACK DORSEY
-\$170 MILLION

NET WORTH: \$2.3 BILLION
 Twitter cofounder gets a rude welcome after returning as interim CEO; shares drop 19% when he announces slowing user growth.



CONVERSATION



GEORGE ANDERS' Aug. 17 cover story highlighting tech companies' increasing inclination to employ not just coders but liberal arts grads drew giddy reaction from readers of a similar intellectual disposition. Tweeted @koinenigrl: "No surprise for those of us w/lib arts degs: Software companies find that liberal arts thinking makes them stronger." Commenting on Forbes.com, Ron Stefanski suggested that "this article needs to be plastered [in] every restaurant in America, where many of the most erudite liberal arts majors currently work. ... It's the ability to ... think critically and creatively that businesses need more than ever." Tweeted @Angie_Terrell: "I don't think I could have excelled in tech without my degrees in cultural anthropology and women's studies." Take heart, lit majors: There's a STEM job out there for you, too.



STARTUP SECRETS

Heralding FORBES' annual Under 30 Summit in Philadelphia this October, Brad Keywell, cofounder of Uptake and Groupon, shared his thoughts on what drives entrepreneurial success.

@KGOODS1989 What should founders look for when making their first ten hires?

@FORBES They should be doers, not managers. You need people who are hungry to prove themselves and to help you win by feeding off your passion and their experience.

@DGR_95 How does one know when an idea can be transformed into an actual business?

@FORBES Great entrepreneurs try to find a reason why their idea should NOT be a business. If you try to find reasons that your idea won't work and can prove to yourself that your idea can overcome those, you'll be convinced that it WILL work and that you're the one who MUST build it.

@DILLONLREYNA What advice would you give young'uns trying to start their first online business?

@FORBES Take advantage of the guidance available online from those who have done it. Make sure you're convinced the world NEEDS what you are starting. Too many businesses are started without an understanding of what is truly valuable to potential customers.

THE INTEREST GRAPH

Readers headed back to school en masse: Online, our Top Colleges package has racked up nearly a million page views ... and counting.

America's Top Colleges 2015

964,978 page views

That "Useless" Liberal Arts Degree Has Become Tech's Hottest Ticket

657,487

Have Three Undergrads Just Created an Instagram for Music?

32,071

The World's Highest-Paid Country Acts

24,040

The Top Drug Launches of All Time

21,410

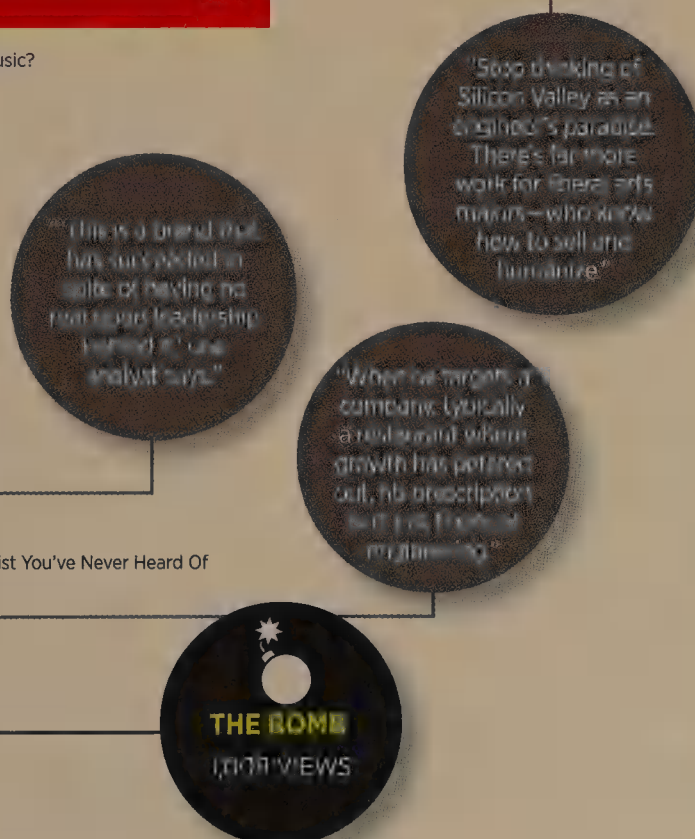
Under New CEO, Crocs May Have a Biting Chance

20,786

Meet Patrick Walsh, the Do-It-Yourself Hedge Fund Activist You've Never Heard Of

20,077

Seal the Deal: Crystal Tumblers Worth Falling For



CHINA SYNDROME



ZILLOW.COM SAYS my house in Silicon Valley—which, as the drone flies, is equidistant from Stanford. Apple and Google has doubled in value since March 2009. The recent surge is partly driven by buyers from China. I'll share an anecdote that everyone in the Valley has seen or heard. A house goes on the market for \$3 million (the typical price for a 2,500-square-foot home on one-quarter acre). Within two weeks the house has sold. Later you learn that it went for 20% over the list price

and that the buyer made an all-cash offer. The buyer was from China.

The market speaks. But what is it saying? I was in Singapore and Taiwan last month and discussed the fact that Chinese buyers are bidding up Silicon Valley prices. Singapore and Taiwan are also seeing this, as are Sydney, San Francisco, Seattle and Vancouver. The question is: Are rich Chinese house buyers diversifying, or are they planning an escape for themselves and their children? Is it Plan A or Plan B?

If you knew the answer, you could make a lot of money. China watchers around the world are trying to guess whether China's stock meltdown and yuan devaluation are a correction or an earthquake. If smart Chinese have taken some stock market profits and reinvested them in American and Australian coastal real estate, then China's 37-year growth story is poised to continue. On the other hand, if smart Chinese are planning their exits, China might be in bigger trouble than most know.

China's critics appeared to be vindicated during this summer's troubles. But beware: Many China bashers have predicted China's demise for a long time. James Chanos, the Wall Street billionaire, has steered investors away from China for years. American journalist Gordon Chang wrote a book predicting China's collapse, *The Coming Collapse of China* (Random House), which came out in 2001. Chang is right about one thing. China's central government, at the pleading of debt-bloated state-owned banks, wants to slap China's thriving online banks, such as Alibaba's Alipay, with credit limits of 5,000 yuan. Hardly enough to buy one iPhone. This high-handed move would cripple Alibaba, Tencent and other Chinese online stars.

CHINA'S DEATH IS EXAGGERATED

To get it wrong regarding China, as a businessperson, investor, politician or military strategist, is a goof that has consequences. The best place from which to gain an understanding of China, I would argue, is not Europe or the U.S. (including Silicon Valley, which has the best American seat from which to view China). It's also not from China, where information

is hard to come by, the contents of your laptop's hard drive are considered free for the taking and Google's Gmail mysteriously stops working. The best places are from the smaller countries in China's neighborhood where free speech and association are allowed. Singapore and Taiwan are two such places. These countries are allies of the U.S. but can't afford to make major investment or political errors regarding China.

The opinion on China from Singapore and Taiwan falls closer to Plan A than Plan B, as described earlier. I was invited to speak at a quarterly board meeting of Temasek, Singapore's \$200 billion sovereign wealth fund. For the fiscal year Temasek's fund—diversified in stocks, real estate and commodities—was up 19%. Smart folks. Several Temasek board members said they thought China's summer stock swoon was a correction. The drop mirrors an earlier correction in Hong Kong stocks. China's projected GDP growth of 7% isn't a mirage, as Jim Chanos and other Western pundits have asserted. China's growth is real and, if anything, is probably understated.

The key error many Americans make regarding China's economy is in underestimating the strength of the country's private and entrepreneurial sectors. They make up 70% of the country's GDP—most of which is vibrant. Any weakness is in hoary old SOEs (state-owned enterprises), which include old-line banks with credit bubbles. Missed are the impact of such entrepreneurs as Xiaomi's Lei Jun, dubbed the Steve Jobs of China, and the enduring strength of tech giants Lenovo and Huawei. Also missed is the role played by the millions of businesses that employ 12 or fewer employees. The small fry are armed: They have smartphones, connections to global markets and (for now) online banking and credit.

For a clear look into what's going on in China—good and bad—read *FORBES ASIA*. I also highly recommend a recent book, *China's Disruptors* (Portfolio), by Edward Tse, a management consultant who has spent the last 20 years getting to know the country's best entrepreneurs. **F**

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WHEN THE POLICEMAN **ABDICATES**



UNDER PRESIDENT OBAMA the U.S. has effectively abdicated its role as world policeman. Using the failure of the war in Iraq as an excuse, America no longer even pretends to be the democratic superpower to whom the wretched of the world can look for help. This has left a moral and physical vacuum at the heart of the global community. And we're learning the hard way that without a world policeman evil rulers flourish, and the people living

under them have to put up with tyranny, however brutal and corrupt.

Take Syria. President Bashar al-Assad continues in power despite the fact that, according to the World Bank, "around half the population have been forced to leave their homes, with 7.6 million internally displaced, 3.8 million refugees, and more than 1.5 million nonrefugee migrants." More than 200,000 are now believed to be dead.

This is one reason that sects such as ISIS have been able to establish themselves in Syria and in northern Iraq.

There are other, more flagrant examples of what happens when America's presence weakens. Vladimir Putin, using the power of the Russian state, has amassed one of the largest fortunes in history and has enabled his circle of cronies, who keep him in power, to do the same. All while Russia's national wealth has declined catastrophically. Industrial production is down nearly 5%, the price of foodstuffs has risen 20%, and 16% of Russia's population now live below the poverty line.

None of this has prevented Putin from pursuing an aggressive military policy in eastern Europe: He has seized the Crimea; his troops, masquerading as Russian nationalists, occupy eastern Ukraine; and he threatens the Baltic states. Recently in Red Square he presided over an enormous parade of troops armed with the latest rockets. Those weapons aren't just for show. Remember, a year ago, that Flight MH17 was shot down by what is widely believed to have been a Russian high-altitude rocket, fired by pro-Moscow troops in Ukraine. All 298 on board were killed. An international inquiry into the incident is due to report in October. But Putin knows the truth—that he supplied the rockets and authorized the firing. If Obama had any guts, he'd insist on nailing Putin's guilt.

There are other, disquieting developments in the Far East. China is not only building up an enormous navy but also constructing bases on coral reefs in the South China Sea. Once the transformation of these reefs into harbors and airstrips is completed, China will treat them as sovereign territory and will have the power to enforce such a decree. Its ultimate aim is to become the dominant power in the entire western

Pacific theater. Control of the South China Sea is an important step toward that objective.

GRIM PROSPECT

The U.S. has been a superpower in the Pacific since WWII's Battle of Midway, nearly three-quarters of a century ago. It has upheld its position by maintaining at least one naval carrier group in the region. Under U.S. protection a large number of nations, including Taiwan, Singapore, Thailand, Japan and South Korea, have remained independent and flourished. Collectively, these Asian countries form an important part of the world capitalist system.

The danger now is that this rich and valuable part of the world will gradually slip out of America's sphere of influence and into China's. This prospect raises all kinds of problems, most notably as regards Taiwan. China has never relinquished its claim to Taiwan and is merely waiting for the opportunity to enforce that claim. President Obama seems to feel that these problems are for the Asian powers to deal with. In short, he's not going to play world policeman, even in the western Pacific.

This has alarmed those in charge of Japan's defense, hence the lower house of Parliament passing bills to allow Japanese forces to operate outside national territories. Obama has given Japan no encouragement to change its outlook, nor has he said what he'll do should Japan decide it needs nuclear weapons. As the world's third-largest economy, Japan can certainly arm itself should it so choose. But without American support it will hesitate to do so, and another opportunity to contain China's growing power will have been missed.

Under America's watch the world has existed as a reasonably law-abiding place. Now, slowly and irrevocably, that ultimate protection is being withdrawn. By the time the world wakes up to the reality of the policeman's absence, it may well be too late to call him back. That is a grim prospect for us all. **F**

PAUL JOHNSON, EMINENT BRITISH HISTORIAN AND AUTHOR; DAVID MALPASS, GLOBAL ECONOMIST, PRESIDENT OF ENCIMA GLOBAL LLC; AND AMITY SHLAES, WHO SERVES AS PRESIDENTIAL SCHOLAR AT KINGS COLLEGE AND CHAIRS THE COOLIDGE FOUNDATION BOARD, ROTATE IN WRITING THIS COLUMN. TO SEE PAST CURRENT EVENTS COLUMNS, VISIT OUR WEBSITE AT WWW.FORBES.COM/CURRENTEVENTS.

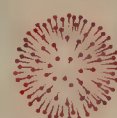
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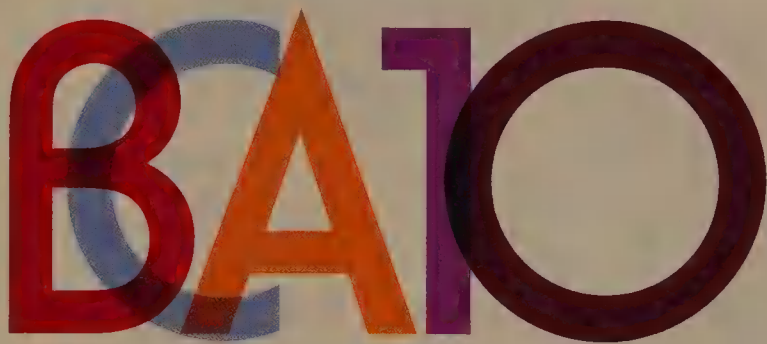


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2016 ETF BUYERS GUIDE 72

North Dakota's richest man, Gary Tharaldson, 69, likes his business conversations to be short and sweet. "If we have to talk too long," he says, "I start thinking maybe I don't need you."

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The Robot Roughnecks

National Oilwell Varco's technology is helping pull oil companies out of the bust by automating how they drill.

BY CHRISTOPHER HELMAN

National Oilwell Varco is the world's biggest builder of oilfield gear. Last year it sold \$21 billion worth of everything from drilling rigs and compressors to blowout preventers and pipe. But this year, as oil prices plunged, NOV's sales have tumbled 26% and its shares are off 50%, erasing more than \$15 billion in market cap. That's what happens when America's oil companies mothball half their drilling rigs and lay off more than 150,000 workers.

But where others see disaster, Clay Williams, CEO of NOV, sees opportunity. Busts have a bright side: Oil companies get interested in learning new tricks. "In the \$100-per-barrel world there's not much incentive to do things differently, because everybody's making money," he says. "But in a \$50-per-barrel world, reality sets in and our customers say, 'How can we do things differently? How can we make the economics work?'"

Williams has an answer: big data and robotics. Rather than drillers using intuition and experience to seek oil, today a core part of NOV's business is selling technology that lets machines do the heavy lifting. "We are in the golden age of oilfield technology," says Williams.

NOV has been working to perfect its automated drilling techniques for more than three years. At one of the company's nerve centers in Houston, sensors embedded behind drill bits cutting through rock miles underground feed



real-time data to charts and squiggles on giant screens. Engineers talk over headsets, using the data to advise workers on board rigs across the country and the Gulf of Mexico. A handful of wells don't get nearly as much human attention, because artificial intelligence is doing the work on some sections. Software sucks up real-time data on well conditions, runs it

Come in, Houston:
CEO Clay Williams
and automation chief
Tony Pink ■ NOV's
operations center.



through painstakingly designed algorithms and immediately adjusts operations—much faster than humans can. Now that NOV has drilled automated wells for the likes of Hess Corp., ConocoPhillips, Chesapeake Energy and more, the verdict is in: Computers can do it 40% faster than humans.

Faster drilling means cheaper drilling,

which makes marginal oilfields economical at lower oil prices. It costs about \$20,000 a day to contract an onshore drilling rig, so shaving four days off a well yields an immediate \$80,000 in savings. If smarter computers can reduce a rig's head count by one, cut another \$200,000 a year in salary, benefits and accommodations. The savings will be greater at offshore projects, where rigs cost more than \$100,000 a day and wells go up to 5 miles deep. Not everyone is convinced. Fred Dupriest, who oversaw drilling at Exxon Mobil for many years and now teaches at Texas A&M, says most of the time the secret to drilling faster is simple: Add more weight to push the drill bit harder. "You don't need a computer for that."

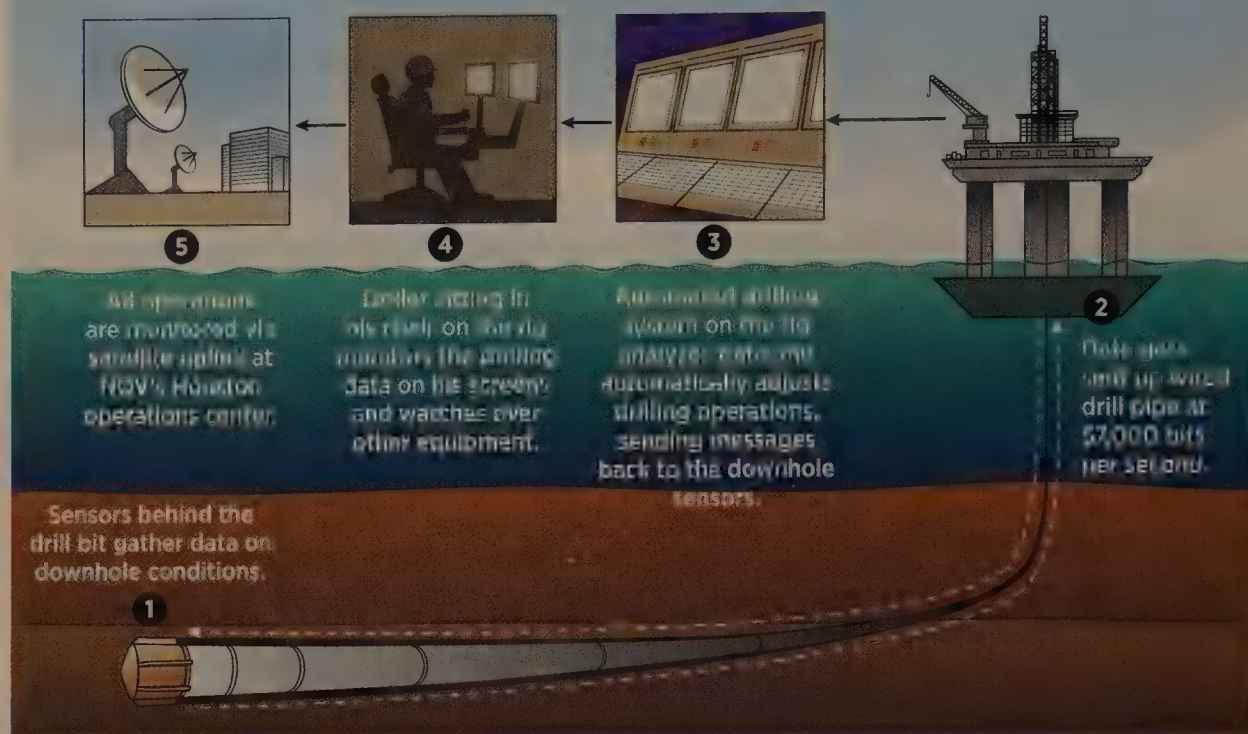
Tony Pink, vice president of NOV's drilling automation division, disagrees. "Drilling is like an art form," says Pink, who spent the first ten years of his career drilling in the North Sea, Nigeria and the Gulf of Mexico.

Think of a rig as a violin with only one string. The driller is the musician trying to get the best sound out of that string. In simple terms, an experienced driller can tell what kind of rock his rig is cutting through just from the way his equipment vibrates. A nice hum means the drill is working efficiently, with most of its mechanical energy employed at cutting rock. Too much friction and force cause problems: bit bounce, stick-slip and backward whirl, which wear out gear and waste a lot of that precious mechanical energy. An effective driller can intuit from minimal data what's going wrong. He'll adjust the action of the bit, the weight on the drill, the speed of rotation—all with the purpose of steering the bit sideways into a thin layer of oil-bearing rock 2 miles underground as efficiently and quickly as possible.

To replace all that experience with a computer, the first challenge is in getting real-time data from under a mile of rock. For more than a decade NOV and its competitors like Schlumberger have been perfecting sensor arrays that sit just behind the drill bit and compute depth, pressure, vibration and the angle of inclination. To get that data to the surface, engineers devised a technique called "mud

IT'S IN THE HOLE

BY ANALYZING DRILLING DATA PIPED FROM 2 MILES UNDERGROUND AND TRANSMITTED VIA SATELLITE TO HOUSTON, NOV HELPS MAKE THE HUNT FOR OIL MORE PRECISE—AND EFFICIENT.



pulse,” which transmits information with high-energy waves through the column of thick drilling mud that fills the bore hole and lubricates the bit. But you can transmit only some 10 bits per second this way, slower than a 1980s-era dial-up modem. “It’s like sending data with smoke signals,” says Williams.

A better method arrived in the early 2000s with the invention of wired drill pipe, which uses electromagnetic induction to transmit data up the pipe itself. This widened the transmission rate to 57,000 bits per second. NOV controls the market by dint of its \$7.4 billion acquisition of Grant Prideco in 2007. But by 2011 NOV found it wasn’t selling much wired drill pipe because it simply didn’t have new applications that could utilize the extra bandwidth and justify the higher price.

It was during a midcareer stint at Harvard Business School that Pink met the man who could help. N.P. Kulkarni is a physicist who has studied dark matter, neutrinos and artificial intelligence and worked at Fermilab. He now heads a company called Quarkonics, which specializes in helping corporations solve engineering challenges. At Harvard they

tackled the automated drilling conundrum as if it were a real-life case study. “Defining the problem took a lot of time,” says Kulkarni, who eventually visited a handful of rigs and enlisted more than a dozen scientists from the likes of NASA and Wayne State University to devise algorithms that could crunch real-time data and smooth out damaging vibrations in microseconds. There were some nervous moments. During the first deployment of the system, on a Chesapeake Energy rig in mid-2012, the system wasn’t receiving data fast enough and shut down after just nine minutes. “It’s good to fail fast,” says Pink.

For now automated drilling is less than a \$100 million business for NOV, but the outlook is rosy enough to make this the rare division—inside NOV and in the entire industry—that is hiring rather than firing. As a former driller, does Pink feel bad about potentially putting even more of his mates out of work with automation? “Get rid of the driller? No, I just want to give the machine responsibility for those repetitive tasks,” he says. “In five years one driller will be able to monitor a handful of wells. From his iPhone.”



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FINAL THOUGHT



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—ISAAC ASIMOV

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Public Nuisances

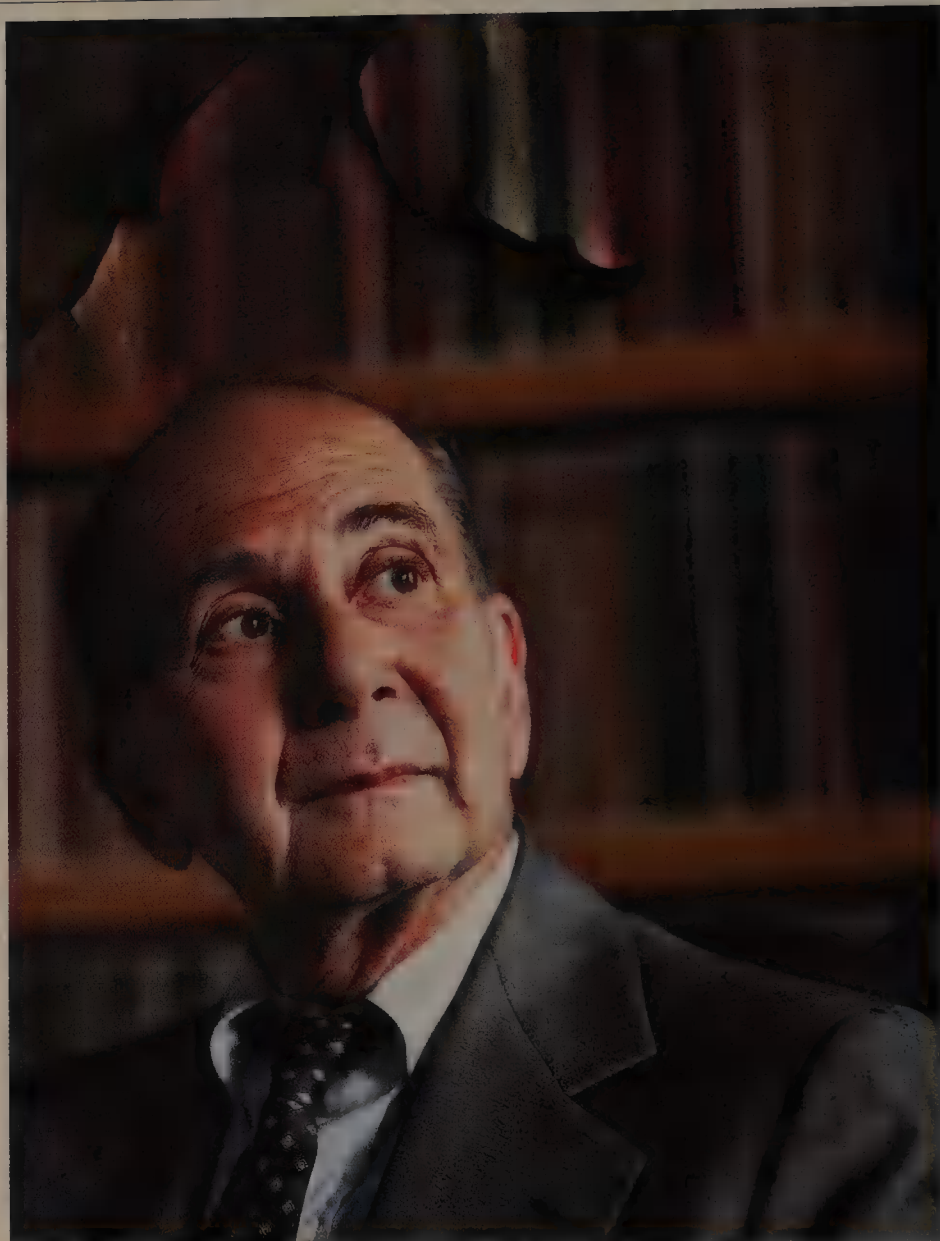
Ever inventive California lawyers hope a toxic mix of lead paint and controversial legal theory can help them soak American business for billions.

BY DANIEL FISHER

California's Santa Clara County, better known as Silicon Valley, has been the center of furious innovation at least since Bill Hewlett and Dave Packard started their company in a rented garage in Palo Alto in 1939. It's where Robert Noyce and Gordon Moore founded Intel in 1968, and where Steve Jobs and Steve Wozniak started Apple Computer in 1976. And now it's where rich plaintiff lawyers have joined with their government counterparts to pioneer a new and toxic invention: the public-nuisance suit.

Later this year a California appeals court will hear arguments over whether Sherwin-Williams, NL Industries and ConAgra should hand over \$1.2 billion to the state to fund a program designed to remove lead paint from millions of homes in Santa Clara County, San Francisco, Los Angeles and other cities. Never mind that only two of the three companies ever sold a drop of the stuff—ConAgra inherited its liability by purchasing a company that had once owned a paint manufacturer—and the industry largely stopped selling lead interior paint in the early 1950s, decades before the federal government ordered it off the market.

None of that mattered to Judge James P. Kleinberg in Santa Clara. Nor did exten-



JAMIE KRIPKE FOR FORBES

sive government-sponsored studies showing that the best thing to do with lead paint is to leave it right where it is, since disturbing old paint can actually lead to more of the poisonous dust being scattered on windowsills and other surfaces. No, Kleinberg decided, the best solution was to dispatch an army of inspectors to examine hundreds of thousands of homes—starting with the ones owned by slumlords who have racked up the largest number of code violations—and then use the defendant companies' money to perform expensive repairs, including fixing leaks and replacing doors and interior trim.

"We often worry about government programs with unintended consequences," says Colorado attorney Timothy Hardy, who has represented NL Industries since November

Paint pain: Colorado attorney Timothy Hardy worries about the torrent of litigation a California ruling could unleash.

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1987 and now, in semiretirement, counts the former National Lead Co. as his only client. "This one, given its size and scope, no doubt will have unintended consequences."

Kleinberg, now retired from the bench, declined to discuss his decision with *FORBES*, citing California ethics rules. But in the ruling he said local governments "lack the resources to force homeowners to remove all lead paint from homes in their jurisdictions," so it was up to him to craft a solution—even though there's already a state lead-abatement program in place, funded mostly by the gasoline industry and paint manufacturers.

Kleinberg's reasoning, if upheld, could lead to any number of similarly structured suits—and business should be terrified. For instance, former supermodel Cindy Crawford is among the parents clamoring for the caulk in school windows to be declared a "public nuisance" because it contains trace amounts of PCBs. And then there's the latest suit by Santa Clara County's Impact Litigation & Social Justice Section, home of the lead paint case. In it, the county accuses Purdue Pharma and four other drug manufacturers of abetting heroin addiction (a public nuisance) because of how they marketed opiate painkillers. The drugmakers have moved to dismiss, saying they can't be sued for selling legal products.

The paint case will be the key test of this new doctrine. Filed in 2000, it also represents the last hope of wealthy plaintiff law firms like D.C.-based Cohen Milstein Sellers & Toll, Seattle's Hagens Berman and South Carolina's Motley Rice, which once saw lead as the next tobacco payday. Courts everywhere but California have rejected the public-nuisance theory for the logical reason that companies can't be held liable for creating a "nuisance" by selling a legal product that in hindsight turned out to be unsafe, nor can judges bundle together millions of privately owned homes into a collective housing stock belonging to the public.

There's also good scientific evidence that the higher lead levels in the blood of poor children comes from exterior dirt and even

from lead-laced Mexican candy and pottery. (An official with a Santa Clara-area health care group, in an e-mail discussing how to spend the lead-abatement money, told officials of the Santa Clara County Health Department that their lead poisoning cases don't come from exposure to paint or soil but from "cultural and daily living practices.")

None of which deters plaintiff lawyer Joe Cotchett, who says he is suing on behalf of the citizens of California and the nuisance law is the perfect way to clean up the state's lead paint problem. "I use the laws to see if we can't correct an injustice," Cotchett says, and there's no statute of limitations for this one. Though he doesn't like the analogy, he's basically saying millions of homes with lead interior paint are like a Superfund site, a continuing toxic threat that must be eliminated.

The appeals court has already ruled on this case once, allowing it to proceed in 2006, but only if plaintiffs could show that the companies knowingly promoted the use of interior lead paint and knew it was unsafe. That triggered an absurd search for newspaper advertisements from the '20s and '30s so plaintiffs could show that Sherwin-Williams and the others had "promoted" lead paint, and an equally absurd search for smoking-gun documents showing they knew lead was dangerous.

Not that anybody doubted the fact: Competitors advertised lead-free paint in the early 1900s, and the U.K. banned it for interior use in the 1920s. But plaintiff lawyers convinced Kleinberg the dangers of lead could be concealed, and he agreed to decide the case without a jury over the defendants' strong objections (another element of their appeal). Should the appeals court uphold Kleinberg's decision, the paint companies will likely appeal to the California Supreme Court. And there's more at stake than a billion dollars of their money. Under Kleinberg's reasoning, interior lead paint is a hazard, and under California state law that makes a property illegal to rent out. Individual owners, Hardy says, "can say, 'Go away.' They can say, 'We don't want you to inspect,' but they can't escape the fact their property is now a public nuisance." 

BY THE NUMBER
BACK-TO-SCHOOL BINGE

The kids might be bummed, but retailers love this time of year, and for good reason. A look at the National Retail Federation's projections for 2015:


\$68 BILLION

Total U.S. back-to-school spending (including college).

\$630

Amount the average family with children in grades K-12 plans to spend.

\$899

Amount the average college student or family plans to spend.

\$97.74

Amount the average U.S. family will spend on school-supply basics such as backpacks, paper and pencils.

\$126

Amount the average college family will spend on dorm or apartment furnishings.

FINAL THOUGHT

 "Lawsuit: a machine which you go into as a pig and come out a sausage."

—AMROSE BIERCE



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The Long Game

Gary Tharaldson figured out cost-saving shortcuts to run more profitable hotels and then sold his low-vacancy empire for more than \$1 billion. Now, at 69, he's after another billion.

BY CAROL TICE

Even for a former gym teacher from Dazey, N.D. (pop. 100, give or take), 69-year-old hotel magnate and near billionaire Gary Tharaldson is pretty unpretentious.

Tell the richest man in the state that you're flying in to visit him at his Fargo headquarters and he'll fetch you himself, rolling up in his red Cadillac crossover and wearing his everyday work uniform of shorts and a sport shirt. Cruising along one of Fargo's main drags, he'll frown at all of the undeveloped land—potential competition for the existing hotels (even though they aren't his).

"He's beyond down-to-earth—he's almost subterranean," says Bruce White, a successful Marriott franchisee who has known Tharaldson since they both started in the hotel business in the early 1980s.

Tharaldson is driven, cheap and shrewd. In March 2006 he sold a portfolio of 130 hotels in a variety of chains to Goldman Sachs for \$1.2 billion. Six months later he sold the Westward Ho Hotel & Casino in Las Vegas, which he'd owned for only a few months, to Harrah's at a profit of \$109 million. "Real estate was going crazy in Las Vegas back then," he says. Not long after, it cratered. Those sales capped an empire-building effort that began in 1982 when Tharaldson bought a Super 8 motel in Valley City, N.D. He added

other low-end hotels and then moved into "limited service" business-suite hotels (no room service, no restaurants), eventually operating more than 350 across the country.

Almost immediately after his massive windfall—with only a brief time-out to head to the 2006 NCAA men's basketball final in Indianapolis—Tharaldson, then 60, started on his next act. "I wondered what I'd do with the money and if it would change me," he recalls. In his Fargo office, looking over projections for his current enterprises, he says, "I think it didn't."

This time out he is placing big bets on natural resources: ethanol, raw land and water. It adds up to an estimated personal fortune of \$930 million. The plan is to build his current holdings into an additional \$1 billion portfolio over the next five years, while his 18-year-old son from his second marriage, Gary II, the one of his seven children he considers most likely to succeed him, gets an education.

When Tharaldson got started in the early '80s, he was an ambitious working-class guy who'd figured out that the only way to get ahead was to own assets rather than look for a big paycheck. His style has always been to set huge goals and then try to exceed them, once telling an interviewer, "From my youth I always wanted to create something on a big scale. I wasn't sure what that would be, but I knew whatever it was it was going to be big."

Gary Tharaldson could spend all of his time on the links. Instead, he's investing in ethanol and water.

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 - unexpected pain, swelling, or joint pain; headaches, feeling dizzy or weak
- ELIQUIS is not for patients with artificial heart valves.

Now I'm going for something better than warfarin. ELIQUIS.

ELIQUIS® (apixaban).

Reduced the risk
of stroke better
than warfarin.

Had less
major bleeding
than warfarin.

No routine blood testing.

ELIQUIS and other blood thinners increase the risk of bleeding
which can be serious, and rarely may lead to death.

Ask your doctor if ELIQUIS is right for you.

Spinal or epidural blood clots (hematoma). People who take ELIQUIS, and have medicine injected into their spinal and epidural area, or have a spinal puncture have a risk of forming a blood clot that can cause long-term or permanent loss of the ability to move (paralysis). This risk is higher if, an epidural catheter is placed in your back to give you certain medicine, you take NSAIDs or blood thinners, you have a history of difficult or repeated epidural or spinal punctures. Tell your doctor right away if you have tingling, numbness, or muscle weakness, especially in your legs and feet.

Before you take ELIQUIS, tell your doctor if you have: kidney or liver problems, any other medical condition, or ever had bleeding problems. Tell your doctor if you are pregnant or breastfeeding, or plan to become pregnant or breastfeed.

Do not take ELIQUIS if you currently have certain types of abnormal bleeding or have had a serious allergic reaction to ELIQUIS.

A reaction to ELIQUIS can cause hives, rash, itching, and possibly trouble breathing. Get medical help right away if you have sudden chest pain or chest tightness, have sudden swelling of your face or tongue, have trouble breathing, wheezing, or feeling dizzy or faint.

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch, or call 1-800-FDA-1088.

Please see additional Important Product Information on the adjacent page.

Individual results may vary.

Learn about savings and offers.
Visit ELIQUIS.COM or call 1-855-ELIQUIS

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Eliquis
(apixaban) tablets

IMPORTANT FACTS about ELIQUIS® (apixaban) tablets

Rx ONLY

The information below does not take the place of talking with your healthcare professional. Only your healthcare professional knows the specifics of your condition and how ELIQUIS may fit into your overall therapy. Talk to your healthcare professional if you have any questions about ELIQUIS (pronounced ELL eh kwiss).

What is the most important information I should know about ELIQUIS (apixaban)?

For people taking ELIQUIS for atrial fibrillation: Do not stop taking ELIQUIS without talking to the doctor who prescribed it for you. Stopping ELIQUIS increases your risk of having a stroke. ELIQUIS may need to be stopped, prior to surgery or a medical or dental procedure. Your doctor will tell you when you should stop taking ELIQUIS and when you may start taking it again. If you have to stop taking ELIQUIS, your doctor may prescribe another medicine to help prevent a blood clot from forming.

ELIQUIS can cause bleeding which can be serious, and rarely may lead to death. This is because ELIQUIS is a blood thinner medicine that reduces blood clotting.

You may have a higher risk of bleeding if you take ELIQUIS and take other medicines that increase your risk of bleeding, such as aspirin, nonsteroidal anti-inflammatory drugs (called NSAIDs), warfarin (COUMADIN®), heparin, selective serotonin reuptake inhibitors (SSRIs) or serotonin norepinephrine reuptake inhibitors (SNRIs), and other medicines to help prevent or treat blood clots.

Tell your doctor if you take any of these medicines. Ask your doctor or pharmacist if you are not sure if your medicine is one listed above.

While taking ELIQUIS:

- you may bruise more easily
- it may take longer than usual for any bleeding to stop

Call your doctor or get medical help right away if you have any of these signs or symptoms of bleeding when taking ELIQUIS:

- unexpected bleeding, or bleeding that lasts a long time, such as:
 - unusual bleeding from the gums
 - nosebleeds that happen often
 - menstrual bleeding or vaginal bleeding that is heavier than normal
- bleeding that is severe or you cannot control
- red, pink, or brown urine
- red or black stools (looks like tar)
- cough up blood or blood clots
- vomit blood or your vomit looks like coffee grounds
- unexpected pain, swelling, or joint pain
- headaches, feeling dizzy or weak

ELIQUIS is not for patients with artificial heart valves.

Spinal or epidural blood clots (hematoma).

People who take a blood thinner medicine (anticoagulant) like ELIQUIS, and have medicine injected into their spinal and epidural area, or have a spinal puncture have a risk of

forming a blood clot that can cause long-term or permanent loss of the ability to move (paralysis). Your risk of developing a spinal or epidural blood clot is higher if:

- a thin tube called an epidural catheter is placed in your back to give you certain medicine
- you take NSAIDs or a medicine to prevent blood from clotting
- you have a history of difficult or repeated epidural or spinal punctures
- you have a history of problems with your spine or have had surgery on your spine

If you take ELIQUIS (apixaban) and receive spinal anesthesia or have a spinal puncture, your doctor should watch you closely for symptoms of spinal or epidural blood clots or bleeding. Tell your doctor right away if you have tingling, numbness, or muscle weakness, especially in your legs and feet.

What is ELIQUIS?

ELIQUIS is a prescription medicine used to:

- reduce the risk of stroke and blood clots in people who have atrial fibrillation.
- reduce the risk of forming a blood clot in the legs and lungs of people who have just had hip or knee replacement surgery.
- treat blood clots in the veins of your legs (deep vein thrombosis) or lungs (pulmonary embolism), and reduce the risk of them occurring again.

It is not known if ELIQUIS is safe and effective in children.

Who should not take ELIQUIS?

Do not take ELIQUIS if you:

- currently have certain types of abnormal bleeding
- have had a serious allergic reaction to ELIQUIS. Ask your doctor if you are not sure

What should I tell my doctor before taking ELIQUIS?

Before you take ELIQUIS, tell your doctor if you:

- have kidney or liver problems
- have any other medical condition
- have ever had bleeding problems
- are pregnant or plan to become pregnant. It is not known if ELIQUIS will harm your unborn baby
- are breastfeeding or plan to breastfeed. It is not known if ELIQUIS passes into your breast milk. You and your doctor should decide if you will take ELIQUIS or breastfeed. You should not do both

Tell all of your doctors and dentists that you are taking ELIQUIS. They should talk to the doctor who prescribed ELIQUIS for you, before you have **any** surgery, medical or dental procedure.

Tell your doctor about all the medicines you take, including prescription and over-the-counter medicines, vitamins, and herbal supplements. Some of your other medicines may affect the way ELIQUIS (apixaban) works. Certain medicines may increase your risk of bleeding or stroke when taken with ELIQUIS.

How should I take ELIQUIS?

Take ELIQUIS exactly as prescribed by your doctor. Take ELIQUIS twice every day with or without food, and do not change your dose or stop taking it unless your doctor tells you to. If you miss a dose of ELIQUIS, take it as soon as you remember, and do not take more than one dose at the same time. **Do not run out of ELIQUIS. Refill your prescription before you run out.** When leaving the hospital following hip or knee replacement, be sure that you will have ELIQUIS available to avoid missing any doses. **If you are taking ELIQUIS for atrial fibrillation, stopping ELIQUIS may increase your risk of having a stroke.**

What are the possible side effects of ELIQUIS?

- See “What is the most important information I should know about ELIQUIS?”
- ELIQUIS can cause a skin rash or severe allergic reaction. Call your doctor or get medical help right away if you have any of the following symptoms:
 - chest pain or tightness
 - swelling of your face or tongue
 - trouble breathing or wheezing
 - feeling dizzy or faint

Tell your doctor if you have any side effect that bothers you or that does not go away.

These are not all of the possible side effects of ELIQUIS. For more information, ask your doctor or pharmacist.

Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

This is a brief summary of the most important information about ELIQUIS. For more information, talk with your doctor or pharmacist, call 1-855-ELIQUIS (1-855-354-7847), or go to www.ELIQUIS.com.

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Bristol-Myers Squibb Company
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August 2014
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After college at North Dakota's Valley City State University, Tharaldson had a brief stint as a high school gym and bookkeeping teacher (he remains a passionate slow-pitch softball pitcher, manager and team sponsor; in 2011 he was inducted into the Amateur Softball Association's national Hall of Fame) and a longer one as an insurance salesman. Early on, his plan was to own 200 hotels by 2000. When the millennium arrived, he owned 352.

His main advantages were his merciless focus on costs and his newcomer's indifference to the way things had usually been done. Bruce White recalls that Tharaldson stood out—with his company-logo shirts and down-home demeanor—when he first visited Marriott's posh headquarters near Washington, D.C. At the time the hotel industry's focus was on luxury and volume. Hotels were routinely built with 120 or more rooms, regardless of market size, recalls Marriott's Liam Brown, president of the chain's North American midmarket brands. Tharaldson, however, concentrated on midsize cities and on building only as many rooms as a market could fill. Brown recalls that Tharaldson also found a way to create an upscale feel at low cost by putting room entries in interior hallways rather than on a building's exterior. "That was a big step forward for our brand," Brown says.

Tharaldson started his own construction company to save on building costs. He also put laundry rooms behind the front desk in his early hotels so night clerks could fold towels when things got slow. Meanwhile, for Hilton, Tharaldson was one of the first franchisees to switch from poured-concrete construction to less-expensive wood frames, says Hilton Senior Vice President Phil Cordell.

White says, "The whole industry benefited from Gary's innovations."

Tharaldson helped develop a hotel niche that could prosper in both good and bad times. The swings of the real estate market taught him patience and a long-term view. When land values plummeted in 2009, he hunkered down rather than take losses. "I

had a period of nonliquidity," he notes drily. "I'd hate to sell too soon or too low."

Similarly, the portfolio that he hopes will make him another billion is designed around industries he believes can ride out economic cycles. One project is Cibola Vista Resort & Spa, a time-share near Phoenix where Tharaldson and co-owner Neil Cumsky have built and sold 248 units and are now constructing 40 more. (Cumsky says he and Tharaldson became partners after lunch in the kind of midmarket chain restaurant Tharaldson patronizes exclusively, in this case a P.F. Chang's.) Tharaldson says he plans to sell off \$80 million of his raw land holdings this year, which by his count would still leave him with roughly \$120 million worth.

He's also gotten into new industries. In 2008 he opened a \$280 million ethanol plant near Fargo, the seventh largest in the country, according to ethanol trade group Growth Energy. The plant buys corn from nearby farms when prices are low and also has storage facilities that allow it to sit on large quantities of fuel if the economics aren't right. The operation netted \$74 million last year.

Tharaldson's longest-term play is a 14,000-acre tract in rural Arizona that holds a huge aquifer. He hopes to connect it to nearby canals operated by the state's main water agency, but building the infrastructure could take decades. He's in no rush. "Gary thinks about his business in terms of generations," says Cumsky. "He thinks 20 years out."

Meanwhile, since 2006 Tharaldson has opened 26 extended-stay hotels across the country. His formula is to grab prime sites in second-tier cities where land is scarce, even if it's expensive. "I'll give up years one and two of profit to have my hotel there forever," he says.

So far, Tharaldson says, that approach has served him well, and he expects it to be as profitable in ethanol, water and time-shares as it has been in hotels. "When times are good, people trade up to better hotels, and when they're bad, they trade down," he says. "Either way, there I am." 

TRENDING

What the 70 million Forbes.com users are talking about. For a deeper dive go to FORBES.COM/ENTREPRENEURS

PERSON

KAREN AIACH

When her daughter was diagnosed with a rare disease, Aiach left accounting in favor of biotech. Now her company, Lysogene, develops gene therapy for rare central nervous system afflictions.



COMPANY

EXO

Are crickets the new kale? Exo cofounder Gabi Lewis calls the critters a "true superfood"; his company roasts them for protein bars available in 200 stores, including CrossFit gyms and Whole Foods.

IDEA

MASTER YOUR MARKET

Nothing burns cash faster than fruitlessly chasing the hottest new trend. Startups should focus on their core competency to the exclusion of all else.

FINAL THOUGHT



"Life is the principle of self-renewal, constantly renewing and remaking and changing and transfiguring itself." —BORIS PASTERNAK



The Next Moody's?

Orchard Capital, an advisor for lenders making online loans, is growing fast.

BY ROBE MANDELBAUM

Twice a day, at 8 a.m. and 4 p.m. Pacific time, Prosper Marketplace, an online service that connects small borrowers and lenders, posts a list of prospective loans for funding. That list is eagerly awaited by hedge funds and other institutions interested in making

unsecured consumer loans at rates up to 32%. All the loans are snapped up within seconds.

That doesn't leave much time for investors to look carefully for the ones that meet their risk and yield criteria. Which is where New York startup Orchard Platform comes in. Orchard builds software that buys loans and crunches all the data available from Prosper and other online loan marketplaces to analyze the performance of those loans over time. Today the company bids on loans for clients on three of the roughly two dozen U.S. online loan marketplaces and captures data from another seven.

Cofounder Matt Burton, 30, a smooth-speaking San Antonio native, got the idea during a trip to the West Coast in 2013.

Cofounders Angela Ceresnie and Matt Burton bonded over a card game.

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AVOIDING STARTUP GOTCHAS

Since opening her own practice in Cookeville, Tenn. in 2003, estate lawyer Joy Buck Gothard has hired four employees. She considers them family, she says, and has encouraged each to get health insurance by paying a subsidy straight from her office checking account to the insurer of the worker's choice. But early this year Gothard, who also owns a cattle ranch, read some alarming news in *The Progressive Farmer*: The Affordable Care Act, a.k.a. Obama-Care, would make arrangements like hers illegal and subject to fines of up to \$100 per day per employee, or \$36,500 per year, effective July 1, 2015. Shortly thereafter her CPA called to warn her she could no longer pay insurance subsidies from her checking account. That call got her moving.

Gothard, 56, started pricing group plans on the ObamaCare small business exchange—just what the law's drafters intended. But she couldn't find an affordable plan. Since she has fewer than 50 employees, she isn't subject to ObamaCare's employer mandate. So, on the advice of her CPA, Gothard has temporarily bumped up workers' salaries to help them pay for individual policies. It's not ideal; she must fork over payroll taxes, and the employees must pay payroll and income taxes on the extra compensa-

tion. But at least she's not running afoul of the law.

"It's frustrating," Gothard says. "People have no idea how easy it is to be punished for trying to do the right thing."

Complain about ObamaCare if you like, but it's only the newest on a long list of legal, tax and regulatory traps that can drain an entrepreneur's energy and pocketbook. From a startup's first day, there are consequential questions. Should you operate as a corporation or partnership? Hire employees or use independent contractors? Choose wrong and a distraction can turn into a disaster. How to avoid mistakes?

▪ **Act quickly.** It's tempting to push off administrative tasks. Waiting too long, however, limits your options and can result in significant penalties.

▪ **Outsource.** Entrepreneurs, by nature, find it hard to let go. But payroll, health insurance and retirement-plan administration are all areas



Zapped: Joy Buck Gothard faced penalties when the rules changed.

where regulations and paperwork can overwhelm a small enterprise. Since her search for an affordable health insurance plan turned into an unsuccessful time sink, Gothard says she'll probably hire an insurance broker.

▪ **Find advisors you trust.** The call she received from her longtime CPA spurred Gothard to action. Find a tax

and accounting team you like, and stick with them. There are way too many tax deadlines and changes for anyone but a pro to keep track of, and even they have problems sometimes.

▪ **Don't rely on pros alone.** Miss a deadline or break a rule and it's your money at risk. Stay up on changes most likely to affect you by reading trade publications and websites for your industry. The Small Business Administration and Internal Revenue Service both offer convenient e-mail alerts for small businesses.

—Kelly Phillips Erb

For more advice on small biz and startup gotchas, go to forbes.com/smallbiztraps.

Burton, then a fledgling consultant, made a tour of small money managers, hoping one would have a good system for tracking portfolios of small loans. They didn't. "All of these guys tried to do it on their own," Burton says. "On the flight back I decided I wanted to start Orchard."

Since then 42-employee Orchard has become the largest of several startups providing analytics to the marketplace lending

industry. According to Morgan Stanley, the volume of loans made by online matchmakers last year totaled \$14 billion and will grow by a compound annual rate of 47% through 2020. Orchard typically charges clients about three basis points monthly against the amount invested by or managed through the company. In July the company's 59 clients made \$227 million in loans using Orchard. Last fall Orchard, expected

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to have 2015 revenue of about \$3 million, raised \$12 million in a round of financing, which valued the company at \$50 million. Backers include Vikram Pandit, former CEO of Citigroup; John Mack, late of Morgan Stanley; and Capital One founder Nigel Morris.

Charles Moldow of venture firm Foundation Capital, who has made millions of dollars of equity investments in marketplace lenders, says, "It's a really valuable idea, because otherwise institutions have to do all the work themselves to figure out how to equate a loan from one platform with a loan from another platform. It's like a rating agency."

Orchard began in 2011 when Burton was developing products for Admeld, a company that used technology to match online publishers with ad buyers. Admeld was preparing to be sold to Google, and Burton had time to kill. When he discovered Lending Club, with its vast listings of loans, "it looked so familiar, like a lot of the early advertising platforms." Burton was fascinated by the reams of information Lending Club published about its loans, although "I didn't understand what most of it meant." Eventually he funded a few loans.

In June 2012 he met Angela Ceresnie, now 33, a vice president for risk management for small-loan underwriting at Citibank, when the two shared a rental on Fire Island with mutual friends. Ceresnie is reserved where Burton is gregarious, but they both like to win. Their business partnership started to form after a round of the card-matching game Set. Burton won. "Later on," he recalls, "it came up that both of us were in Lending Club loans. She pulled up her portfolio, and I pulled up mine."

"The returns I was getting were really high," Ceresnie says. "I think they were 15 or 16%. Matt was getting 9 or 10."

Ceresnie began tutoring Burton in underwriting. The pair started blogging about marketplace lending, and in 2013 they began hosting meet-ups for people in the

industry. "Everybody was telling us that we needed to be a hedge fund," says Burton. "I was not sold on that, mainly because I never worked at a hedge fund." Instead, they started consulting for money managers tantalized by the possible returns available online. "They were afraid of having to keep track of a \$100 million investment made in \$8,000 increments," says Burton. After his trip to the West Coast, Burton says, "I said to Angela, 'We have the skill set to do that ourselves.'" With two other cofounders—Jonathan Kelfer, a software engineer from Google, and David Snitkof, a former senior vice president for small business and commercial banking at Citibank—an Orchard was planted.

Jay Posner, managing partner of client Blue Cub Capital Management, says Orchard "levels the playing field. The ability to buy loans milliseconds after they're made available allows me to compete with larger funds that have more resources."

"Orchard has been really, really good" at buying loans, says Aaron Vermut, chief executive at Prosper, whose president, Ron Suber, has an equity stake in Orchard. "They're fast, they screen well, and they get a high win rate on their bids."

Burton admits his ambitious agenda for Orchard, including developing a secondary market for online loans, faces obstacles. "It's a very promising industry, but today there's just a lot of friction," he says. One source of friction is the marketplace lenders themselves; most are still too small to build the automated distribution system Burton envisions.

There is, however, no shortage of enthusiasm about the industry at the gatherings Orchard still hosts every few weeks in New York City and elsewhere. "Our first meet-up was seven people in a bar on the Lower East Side," Ceresnie says. One evening this winter she had to shout to be heard in a San Francisco loft: "Look at this room! There are people who flew to San Francisco to come to this event! I come here, and I'm overwhelmed!" ❄️

FINAL THOUGHT

❄️ *"It is the quality of lending over the quantity of lending."*

—LEWIS THOMPSON PRESTON

GO CONSIDER STOP



DISRUPTION HAPPENS HERE

Which startups are blowing up right now? CircleUp's third annual list of the 25 most innovative consumer and retail brands offers clues.

CULT WORKOUTS

The stodgy gym is out; the exercise "experience" is in. Tough Mudder, Barry's Bootcamp and SoulCycle (which just filed for an IPO) all make the list.

DIRECT TO CONSUMER

Mattress startup Casper, shaving emporium Harry's, underwear subscription service MeUndies: Online-only brands are outfoxing traditional retail.

SUGARY, SALTY SNACKS

Consumers are in search of better-for-you foods such as SkinnyPop's popcorn and Bai Brands' low-cal drinks. Watch out, Pepsi.



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INSTRUMENTS FOR PROFESSIONALS

Rulers of the Stream

Three data whizzes from inside LinkedIn have spun out into one of the hottest little companies in tech.

BY ALEX KONRAD

To find one of technology's next big ideas, you have to drive a couple miles down the road from the headquarters of Google and LinkedIn to a one-story bungalow next to a dentist's office in Mountain View, Calif. Behind an unmarked door you'll find Confluent, a year-old startup keeping the data flowing at some of the biggest and most information-rich firms in Silicon Valley, including Uber and LinkedIn. Confluent's founders and 17 employ-

ees can still get in the company's single conference room, where CEO Jay Kreps' laughter echoes off the walls. "We're one step up from a garage," he says, a giggle tumbling out mid-phrase.

Not for long. Soon Confluent will move into a shiny new office in Palo Alto more befitting a company that invented the way Twitter manages its tweet analytics, the movie recommendations at Netflix and the surge pricing at Uber all keep running. Confluent is building a business

Kafkaesque
Confluent's founding
trio—Jay Kreps, Neha
Narkhede and Jun
Rao—helped build the
software Netflix, Uber
and Twitter rely on.



PHOTOGRAPHED BY GABRIELA HASBUN FOR FORBES. STYLED BY JOSEPH DEACETIS. GROOMED BY AMY LAWSON. JAY KREPS AND JUN RAO WEAR THEORY. NEHA NARKHEDE WEARS A DRESS BY MILLY WITH BRACELET BY ALEXIS BITTAR.



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Erika Ferrell, IT Director



By consolidating their infrastructure, Sub-Zero Wolf was able to eliminate equipment as well as the need for remote IT experts. With Riverbed, network loads were reduced, performance improved, and customers satisfied. More than 26,000 companies rely on Riverbed for end-to-end application visibility, optimization, and control. Riverbed.com/performance

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on top of open-source data-processing software called Apache Kafka that its founding team created in 2010 while at LinkedIn. Apache Kafka, the free version, is now used by thousands of companies and tens of thousands of users, with downloads up 400% in the first six months of 2015. Confluent intends to build a business selling management tools and services that make it easier to run Kafka. Fresh off raising \$24 million from Index Ventures and early backer Benchmark, Confluent plans to double head count and roll out a major new software release in October, bringing the gospel of real-time data flow to more nontech companies.

Improving the use of and access to data has become a priority for most businesses, in and out of the tech sector. Better data can tell a company whom to advertise to, whom to target in sales calls and when a demand spike will occur. But the amounts of data under review are reaching unmanageable levels. LinkedIn, for example, manages more than 300 billion—with a “b”—user-related events every day. From website visits to mobile phone usage and sensors of all kinds, companies are struggling to access this flow in real time. Typically data are retrieved and analyzed in batches, but batch runs can take hours to compute. Confluent’s software solves the immediacy issue by ensuring that all of the incoming data flow in a continuous stream, like a chocolate river in each customer’s Wonka factory. Right away companies can change prices (e.g., Uber surge fares) or pick the best product to show a customer (such as Netflix suggested titles) by plucking such data as they go by. Those insights get fed back into the river, making the whole system a little bit smarter the next time. “You currently find out what happens with your data once a day, at midnight,” says Neha Narkhede, a cofounder who manages Confluent’s engineers. “We turn data into a central nervous system, so you can react to events faster.”

The idea of using data in streams predates Confluent, but the practice was limited to internal use at the big tech companies that already employ engineers steeped in the arcana of real-time processing—much like Confluent’s founding trio. Kreps, 35, is a longtime Californian who rose through LinkedIn’s engineering ranks

to serve as technical lead of its relevancy algorithms and data systems. Originally from India, Narkhede got a master’s degree at the Georgia Institute of Technology before working on internal projects at LinkedIn, before settling on Kafka. A Beijing native and a Ph.D., Jun Rao spent a decade as an IBM researcher before joining LinkedIn’s data team in 2010. He now focuses on open-source Kafka and early customer adoption. The three of them, along with a handful of other LinkedIn employees, created the basic Kafka software and released it publicly for other companies to use and improve. “It’s our passion to do this,” Rao says, “because infrastructure is a means to an end for so many things.”

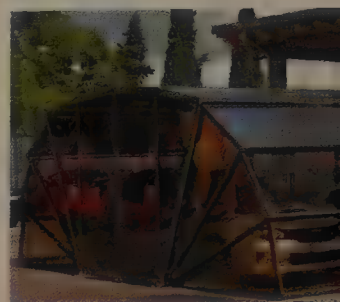
Kafka quickly picked up early users at Airbnb, Box, Cisco, PayPal, Square and Yahoo. When the three decided early last year they could build a separate business around Kafka, they got strong support from the higher-ups at LinkedIn, which decided to make an investment in Confluent, its first in a startup. Confluent’s revenue today is minimal, but there’s strong evidence it can turn on the money spigot quickly. Its version of Kafka is downloaded 50,000 times a month, and without a real sales team or any big marketing push it already has paying customers, including a leading traditional retailer, one of the world’s biggest advertising agencies, a huge credit card issuer and a media holding company. Confluent will spend the next few months adding a range of security features and tutorials to make it easier for more types of developers. Says Mike Volpi, who led Index Ventures’ investment in the startup: “The more on-ramps you have, the more valuable the freeway becomes.”

Experts suggest Confluent’s revenue could approach \$10 million next year and pass \$50 million in 2017. The company could echo the recent success of another open-source darling, Docker, which has turned record adoption of its computing tools called “containers” into a growing enterprise suite and a \$1 billion valuation. Confluent is likely worth about one-sixth that today but not for long. “Every person we hire uncovers millions of dollars in sales,” says early investor Eric Vishria of Benchmark. “There’s real potential [for Confluent] to be an enterprise phenomenon.”



GADGETS WE LOVE

GIMME SHELTER



Leave it to the Italians to come up with the perfect contraption to shelter your Lambo or *famiglia* while having a nice plate of ravioli under the Tuscan sun. The Gazebox (price TBD), like an armadillo for your driveway, fans out from gazebo mode to become a polycarbonate-walled garage for a car or motorbike. More compact than a standard garage, it keeps snow, rain and bird droppings out while permitting airflow. Style tip: You can change the colors of the built-in LED lights by remote control for disco mode. Options include air-conditioning, theft alarm and solar panels.

FINAL THOUGHT



“It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.” —ARTHUR CONAN DOYLE

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2016 ETF Buyers Guide

Long-term investor? These funds are the best of the best.

BY WILLIAM BALDWIN

Investment problem: too many choices. There are 16,700 funds. Here's a three-step solution. 1. Confine your attention to the exchange-traded ones, the variety, invented in 1993, that has shares trading like shares of Tesla or AT&T. 2. Choose the category—long bonds, for example, or a diversified mix of U.S. stocks. 3. Buy one of the cheapest funds on the list.

This solution isn't right for everyone. It doesn't work for someone with aspirations of beating the market. But it makes sense for many, perhaps most, savers.

For long-term investors ETFs have two powerful advantages. One is that they usually charge very low management fees. The other is that they push the fund's trading costs onto the guilty parties, namely speculators and impatient customers.

A traditional open-end fund is obliged to take in new customers and redeem departing ones

every day. The consequence is that in-and-out investors force the manager to execute buys and sells of portfolio stocks at unfavorable prices, with the resulting damage inflicted on all the fund's investors. ETFs sidestep this problem by taking in and redeeming baskets of stock instead of cash. The basket weavers are middlemen who buy and sell ETF shares on a stock exchange. Speculators can trade the bejesus out of an ETF if they want to, but they cough up a spread to a middleman every time.

Long-term investors in ETFs are the winners in this arrangement. They can use our ETF guide, excerpted on page 74, to find the best deals. We have a unique three-part analysis of investing costs.

The first component is the expense ratio. A price war in the fund industry has brought this number down to 4 or 5 basis points (\$4 or \$5 annually per \$10,000 invested) for the cheapest stock funds and to 5 or 10 basis points for mainstream bond funds.

Next is the trading cost—that bid/ask spread exacted by the middlemen. If the shares are quoted at \$60 bid, \$60.03 ask, you'll lose \$30 when you buy and sell 1,000 shares. At billion-dollar funds the spread doesn't have much impact. On smaller funds it can be significant.

The third item in our formula is the offset to expenses coming from securities lending income. Funds lend out stocks and occasionally bonds to arbitrageurs and short-sellers for a fee. Securities lending is a big sport at BlackRock, which hands back \$200 million a year of the resulting loot to ETF shareholders. Vanguard's ETF holders are raking in \$120 million a year. In portfolios of small-company, foreign and speculative stocks, sec lending can move the cost needle a long way, sometimes into negative territory.

U.S.-registered ETFs have \$2 trillion of assets, to \$13.5 trillion for open-end mutual funds other than money markets. But the upstarts are growing four times as fast. At this rate ETFs will



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overtake open-end funds in mid-2024.

There are a lot of reasons for ETFs to win the popularity contest. They are predominantly passive index portfolios at a time when investors and their advisors are turning away from active management. They don't have the performance drag that an open-end fund suffers as a conse-

quence of its obligation to invest new money and cash out departing customers. Their bid/ask spreads are shrinking as they win more of the investment business and trading volumes go up.

One more tailwind for ETFs: Employees with large 401(k) balances can use them to escape an investment menu that has only expensive open-

end funds on it. You can use this escape hatch if your plan has a "brokerage window."

For now, open-end funds are the usual 401(k) choice for savers who want small, regular contributions invested automatically. But fractional shares and automated purchases could someday become as easy for ETF buyers as for mutual fund buyers.

Brokerage commissions can be a nuisance for ETF buyers. Still, commission-free trading opportunities abound, especially at brokers trying to land new accounts. For this reason we don't include commissions in our cost scorecard.

If you are a traditionalist who owns only open-end funds, take another look at your funds' financial statements. How do their costs compare with the numbers on our ETF winners' list? Are you missing an opportunity to boost your retirement wealth?

Our survey includes ETFs with assets no less than \$50 million and net expenses (expenses less securities lending income) no higher than 0.4%. Morningstar provided asset and expense ratio data. Trading costs came from an average of bid/ask spreads taken on three different days off Bloomberg. We got securities lending income from fund sponsors. The full list of 414 funds is at forbes.com/etfguide.



BEST ETFs FOR LONG-TERM INVESTORS

THE COST IS WHAT YOU GIVE UP IN OVERHEAD AND TRADING SPREADS HOLDING \$10,000 IN A FUND FOR A DECADE.

TICKER	FUND	ASSETS (\$MIL) ¹	10-YEAR COST ²
BIGGEST			
SPY	SPDR S&P 500	\$177,403	\$153
IVV	ISHARES CORE S&P 500	69,835	107
EFA	ISHARES MSCI EAFE	60,388	513
VTI	VANGUARD TOTAL STOCK MARKET	56,360	46
VWO	VANGUARD FTSE EMERGING MARKETS	43,996	163
QQQ	POWERSHARES QQQ	41,482	324
BEST FOR LARGE-COMPANY AND DIVERSIFIED U.S. STOCKS			
VTI	VANGUARD TOTAL STOCK MARKET	\$56,360	\$46
SCHB	SCHWAB US BROAD MARKET	4,963	50
SCHX	SCHWAB US LARGE-CAP	4,545	61
VOO	VANGUARD S&P 500	33,857	79
ITOT	ISHARES CORE S&P TOTAL US STOCK MKT	2,499	104
IVV	ISHARES CORE S&P 500	69,835	107
BEST FOR DIVERSIFIED FOREIGN STOCKS			
VEA	VANGUARD FTSE DEVELOPED MARKETS	\$28,466	\$57
VXUS	VANGUARD TOTAL INTERNATIONAL STOCK	4,837	99
SCHF	SCHWAB INTERNATIONAL EQUITY	4,243	106
VEU	VANGUARD FTSE ALL-WORLD EX-US	14,442	119
IEFA	ISHARES CORE MSCI EAFE	6,285	168
IXUS	ISHARES CORE MSCI TOTAL INTL STOCK	1,669	213
BEST FOR MEDIUM-TERM BONDS			
AGG	ISHARES CORE US AGGREGATE BOND	\$25,467	\$86
SCHZ	SCHWAB US AGGREGATE BOND	1,644	88
BND	VANGUARD TOTAL BOND MARKET	26,419	116
SCHR	SCHWAB INTERMEDIATE-TERM US TRS	347	161
BIV	VANGUARD INTERMEDIATE-TERM BOND	6,132	169
LAG	SPDR BARCLAYS AGGREGATE BOND	991	172
BEST FOR LONG-TERM BONDS			
IEF	ISHARES 7-10 YEAR TREASURY BOND	\$6,237	\$184
BLV	VANGUARD LONG-TERM BOND	1,158	185
TLH	ISHARES 10-20 YEAR TREASURY BOND	392	191
TLT	ISHARES 20+ YEAR TREASURY BOND	5,133	195
TLO	SPDR BARCLAYS LONG TERM TREASURY	169	202
VCLT	VANGUARD LONG-TERM CORPORATE BOND	962	216

¹JULY 28. ²REFLECTS BID/ASK SPREAD, EXPENSE RATIO AND BENEFIT FROM SECURITIES LENDING INCOME; ASSUMES 5% RETURN. SOURCES: MORNINGSTAR; BLOOMBERG; FUND DISTRIBUTORS.

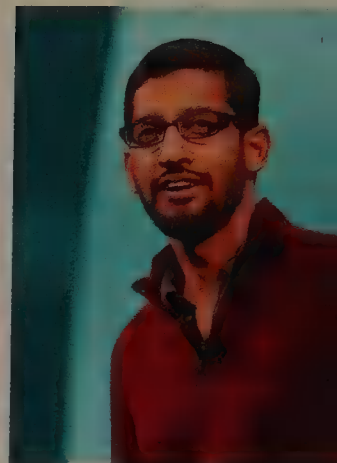
FINAL THOUGHT



"Speculation is an effort, probably unsuccessful, to turn a little money into a lot. Investment is an effort, which should be successful, to prevent a lot of money from becoming a little." —FRED SCHWED

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PEOPLE SUNDAR PICHAI

Longtime Googler gets a promotion to CEO of the core business as company reorganizes under Alphabet umbrella.

COMPANY ALIBABA

The bloom is off the rose. After revenue grows at its slowest pace in three years, the Chinese e-commerce giant is in danger of falling back to its IPO price.

IDEA OUT OF BREADTH

Stock winners struggling to outpace losers in aging bull market. Warning signs flashing.

AP PHOTO / JEFF CHIU



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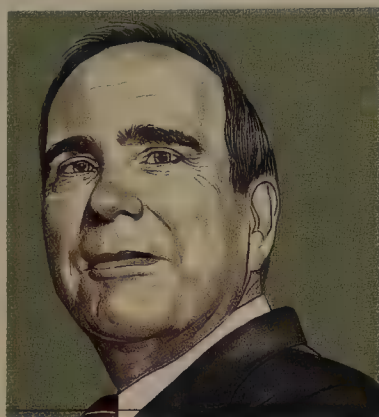
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LEARNING TO LOVE PREFERRED



PREFERRED ARE the redheaded stepchildren of income investing. They just don't get any respect, even though in these times of diminished rates of return on all but the lowest-rated junk bonds, failing to consider preferreds makes very little sense.

One knock on preferreds is that they are mostly below investment grade or "junk rated." This is correct, but it's also misleading. Citigroup's preferreds (C K, 27) are rated BB+ and yield about 6.3%,

but its senior debt is rated A- and yields 4.5%. The ratings mainly tell you the securities' ranking in a bankruptcy, an event whose likelihood is more telling from the A- rating than the BB+. So, if you agree with me that Citigroup is a "too big to fail" bank, why not collect the extra 180 basis points of yield on the preferreds over the bond yield? Think of the yield premium for preferreds not as a default-risk premium but as an ignorance premium.

Large institutions that manage billions in client assets avoid anything that is not investment grade despite knowing that the risk-reward ratio for such securities is in a client's favor over investment-grade issues. The institution, however, is more concerned with protecting itself against lawsuits should a junk issue fail. It also wants to protect itself against

THE YIELD PREMIUM FOR PREFERREDS IS NOT A DEFAULT-RISK PREMIUM BUT AN IGNORANCE PREMIUM

rogue employees taking undue risks with client capital. I once forced this issue with a brokerage firm that refused to execute preferred trades in below-investment-grade issues. It indicated it would relent if my client agreed to sign a letter saying they were sophisticated investors and knew they were buying a high-risk security. Talk about a good way to lose a client! This same firm had no problem allowing investment in a closed-end junk bond fund.

You may also hear the argument that preferreds are not liquid and thus are hard to sell. This is true if you want to buy or sell a half-million dollars or more of a single issue, but not so much for small investors interested in lesser amounts. This low liquidity is actually a virtue in that institutions cannot participate in this market in a meaningful way, which keeps yields substantially higher than would otherwise be the case.

When customers inquire about preferreds with their friendly broker, they are mostly discouraged from buying them. This is because brokerage firms provide no research on such securities, and the broker tries to discourage such purchases either because of in-house restrictions or because it really doesn't know these securities. Besides, clients tend to hold them for a long time, and that's not good for commissions. Brokers would rather sell you a mutual fund.

Preferreds are complicated. There are seven different categories, and each category and each issue has customized terms and provisions. I don't use the term preferred stock because many preferreds are actually bonds in \$25 denominations. Those that are stocks may or may not pay qualified dividend income that enjoys a lower tax rate. Some pros argue that the lack of a due date on most preferreds means that they have infinite duration, but this is not true. Most preferreds experience price changes that largely track the rise and fall of the yield on the ten-year Treasury note.

Here are some preferreds that offer compelling yields for individual investors but get no love from institutions. **MORGAN STANLEY FLOATING RATE (MS A, 21)** is rated BB and yields 4.8%. Its yield is tied to Libor +4%, so it offers good protection from rate rises. **ASPEN INSURANCE HOLDINGS (AHL A, 26)** has a 7.4% issue that has been recommended by me for some time. It yields 7% thanks in part to its split ratings of BA1/BBB-. **HERCULES TECHNOLOGY GROWTH CAPITAL (HTGY, 25)** has a 7% preferred yielding 6.9% that is unrated. This lender to high-tech development companies has a common stock that pays out a 10.5% dividend, which demonstrates more depth in payment ability than just ratings could convey.

While equities are today's market darlings, the rewards from preferreds can be substantial, even when the stock market suffers a setback. **F**

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HEALTHY ALTERNATIVES TO A BIOTECH BUBBLE



EXPLOSIVE RETURNS over the last four years have attracted hedge funds and retail investors alike to biotechnology stocks, but soaring stock valuations seem to underdiscount the probability of failure with clinical trials, which are binary outcomes and nearly impossible to predict. It's time to pull in the reins and turn to some less sexy but more predictable health care stocks, especially those benefiting from the changing landscape of medical services, both at

home and abroad. Here are three small-cap growth ideas without the binary risk or cult popularity of biotech.

The Affordable Care Act was designed to decrease emergency room visits, but a recent study from the American College of Emergency Physicians suggests exactly the opposite: ER visits have spiked. Based in Lewisville, Tex., **ADEPTUS HEALTH (ADPT, 113)** is the largest operator of freestanding emergency rooms, with 69 facilities in Texas, Colorado and Arizona, some branded under the name First Choice Emergency Room and others in partnership with hospitals. Adeptus' ERs have the same capabilities as traditional hospital emergency rooms, including CT scans, ultrasound, X-rays

RIDE A WAVE OF CHANGE IN HEALTH CARE WITH THESE THREE STOCKS

and labs, and are typically located conveniently at major intersections in affluent suburbs. A declining supply of hospital ERs and increasing patient visits have created a supply-demand imbalance that Adeptus is attempting to leverage. By the company's estimations, Adeptus visits cost less than those at the typical hospital ER, averaging \$1,865 per patient versus \$2,200 to \$2,400 at a hospital. Adeptus is opening new centers in existing markets, and I expect it to enter new markets by partnering with hospital systems, as it did in joint ventures with Dignity Health in Arizona and UCHHealth in Colorado. As with early-stage retail concepts, valuation based on near-term earnings looks pricey but is quite reasonable based on earnings a couple years out. Shares trade for 61 times my forward estimate of \$1.80, with 50% growth in revenues and even faster growth in earnings.

San Diego's **AMN HEALTHCARE SERVICES (AHS, 35)** is a leading provider of temporary staffing of traveling nurses and physicians. Health care visits are on the upswing in a cycle that tends to mirror the economy on a lagging basis and in this case is exacerbated by increased insurance coverage, thanks

to ObamaCare, and, more subtly, aging demographics. The net effect has been an increase in insured patients and a decrease in uncompensated care, so hospitals need more nurses and have the extra money to get them. Over the longer term aging baby boomers will need more medical care, while aging nurses will exit the workforce faster than they can be replaced. Taken all together, there's a shortage of doctors and nurses that isn't going to end quickly. AMN is also benefiting from a migration of health care providers to its industry-leading managed services platform and vendor management systems, under which AMN provides turnkey management of the provider's staffing needs. The company is expected to increase sales by 35% to \$1.4 billion this year, with double-digit organic growth and the balance from acquisitions. Shares trade for 29 times my forward estimate of \$1.15 in earnings per share.

Headquartered in Beijing, **IKANG HEALTHCARE GROUP (KANG, 17)** is the largest private provider of medical checkups in China. There the market for annual physicals is still in its infancy but growing rapidly, driven by increased health awareness, government policy and rising disposable income. IKang competes with public hospitals through advantageous pricing and better-tailored services. The market for preventive medicine is fragmented, with Frost & Sullivan ranking iKang as the market leader with just 13.6% market share. With an established national network of exam centers and a recognizable brand name, iKang is positioned to be the consolidator. In 2014 it serviced 3.6 million people and counts 81 of the 100 largest companies in China as clients. IKang operates 70 centers in 18 cities and is planning to add 20 to 25 new centers this year. Over time, expect to see iKang expand its offerings in China's second- and third-tier cities, and to cross-sell other offerings, including disease screening and dental services. Shares trade for 21 times my forward estimate of 80 cents. Revenue this year should increase 33% to \$387 million, and earnings are forecast to surge 56%. 

JIM OBERWEIS IS PRESIDENT OF OBERWEIS ASSET MANAGEMENT AND EDITOR OF THE OBERWEIS REPORT. FOR MORE INFORMATION VISIT WWW.FORBES.COM/OBERWEIS.



WRITTEN BY HEIDE BRANDES

WHEN GENERAL ELECTRIC SELECTED OKLAHOMA AS THE SITE FOR A NEW \$125 MILLION GLOBAL HUB OF OIL AND GAS TECHNOLOGY INNOVATION IN 2013, IT DID SO FOR A REASON.

Oklahoma state leaders, private industry and economic development agencies came together in a unique partnership to attract the new facility that would bring 130 high-tech jobs.

The CEO of Devon Energy, one of the largest oil and gas companies in the state, and other industry CEOs sat down with GE's leaders to explain why Oklahoma was the best choice for expansion. Government officials like Governor Mary Fallin and Oklahoma City Mayor Mick Cornett explained the tax and business incentive packages Oklahoma offered. That kind of business collaboration made an impression on General Electric.

"Collaboration is key to leading the unconventional resource revolution," says Jeff Immelt, chairman and CEO of General Electric. "In Governor Fallin and the people of Oklahoma, we've found excellent partners."

Match a booming economy with a low cost of living, and you see why more and more industries are turning to Oklahoma as the place to set up shop. More than 120 business announcements were made statewide in 2014, adding up to more than \$4 billion in new investment and creating 12,600 additional jobs. Nineteen of those announcements were new companies making Oklahoma their home.





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In the first half of 2015, 65 announcements of new or expanding businesses were made in Oklahoma, totaling more than \$813 million in new investment and over 4,400 projected new jobs.

Oklahoma supports industry by offering one of the best incentive packages in the nation. Incentives such as the Quality Jobs Program, which offers special incentives for businesses creating jobs, and the Investment/New Jobs Tax Credit Package, which gives manufacturing companies a five-year tax credit or a credit of \$500 per new job, offer added reasons to look at Oklahoma for business development.

"Quality Jobs is responsible for recruiting much of our new and expanding business," says Deby Snodgrass, Oklahoma secretary of commerce and executive director of the Oklahoma Department of Commerce.

"If you look at the economic growth of our state over time, 80% of that growth is through expansion. We have to have ways to help companies that are located here grow and expand, but also reward companies that choose to do business here," she explains.

OKLAHOMA STRONG

Oklahoma continues to remain economically strong in job and industry growth. Oklahoma's unemployment rate remains below the national average. Across the board, industries in Oklahoma have experienced growth since the recession, but five economic areas lead the pack in wealth generation, wages, growth and economic impact.

The aerospace and the defense industry includes Tinker Air Force Base—one of the world's largest military/defense maintenance, repair and overhaul (MRO) facilities—as well as American Airlines in Tulsa, one of the largest commercial MROs in the United States.

In July 2015, Boeing broke ground on an \$80 million, 290,000-square-foot facility in Oklahoma City, in addition to announcing that the company will move the headquarters for one of its divisions to Oklahoma City.

"Oklahoma has a remarkable workforce; a supportive, stable political environment; and an excellent quality of life our employees appreciate," said Steve Hendrickson, director of government operations for Boeing. "The tax credits are an invaluable tool in the attraction and retention of employees with skills critical to the success of our customers."

The energy sector is king in Oklahoma, with approximately one-quarter of all Oklahomans employed in the industry. More than 500 energy companies have found success operating in the state.

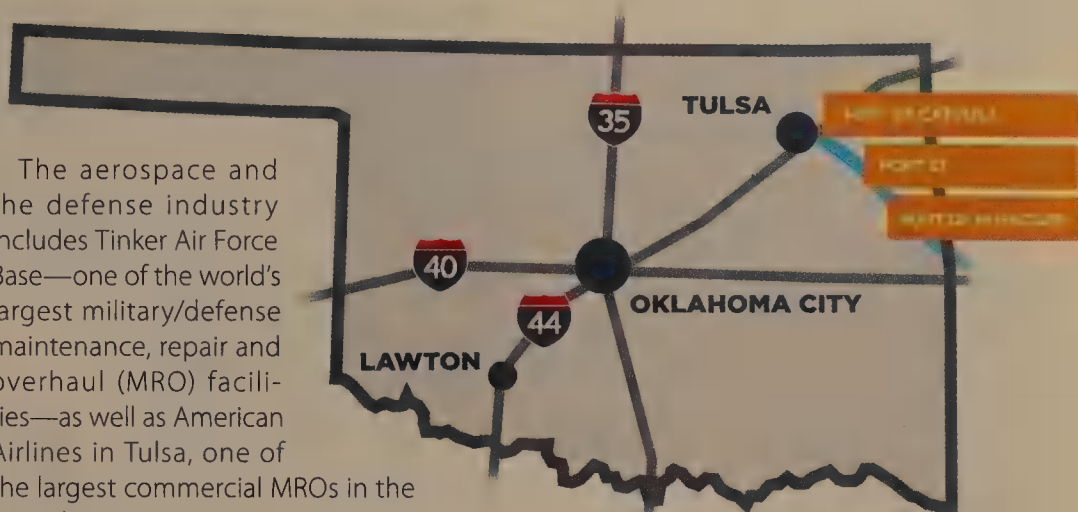
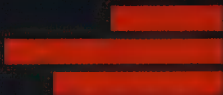
Devon Energy, an S&P 500 oil and gas company based in Oklahoma City, has more than doubled its onshore North American oil

production since 2008. The company also is a leading producer of natural gas and natural gas liquids.

"Oklahoma's pioneering spirit promotes entrepreneurship, creating a favorable environment for businesses of all kinds," says Devon President and CEO Dave Hager.

"In particular, Oklahoma City has long been a hub of innovation in the energy business, with professionals and companies developing both the incremental and significant breakthroughs that have given us our rich history in the oil and gas industry and contributed greatly to America's energy security," says Hager.

Transportation and distribution are also big players in the state's economies. The state boasts of three Class I railroads, 137 public use airports and two international airports, three inland ports and three major

devon

Commitment Runs Deep

interstate highways, all designed to support manufacturing, shipping, transportation and distribution.

Tulsa's Port of Catoosa—the farthest inland, ice-free port in the U.S.—receives more than 2.2 million tons of cargo each year.

As many assume about the state, agriculture is a top industry in Oklahoma and manufacturing remains strong. However, many are surprised to know that Oklahoma has more than 500 bioscience companies.

Oklahoma's information and finance sector includes more than 70 data centers statewide for companies such as Google and IBM. In Oklahoma City alone, more than 400 tech companies employ roughly 30,000 people, according to the Oklahoma Department of Commerce.

NATIVE SUCCESS

Oklahoma's native tribes have also experienced impressive growth. One tribe, the Chickasaw Nation, has an annual economic impact of more than \$2.43 billion in Oklahoma and operates more than 100 businesses with more than 13,000 employees.

Chickasaw Nation Industries (CNI) and Bank2 are two of the tribe's more successful business operations outside of gaming. Bank2 has grown from \$7.5 million in assets in 2002 to more than \$100 million today.

"Chickasaw Nation Industries is a vital component of our economic development strategy. CNI has grown from an initial investment of \$50,000 to more than \$250 million in annual revenues, with ten LLCs operating

within the corporate structure," says Chickasaw Nation Governor Bill Anoatubby.

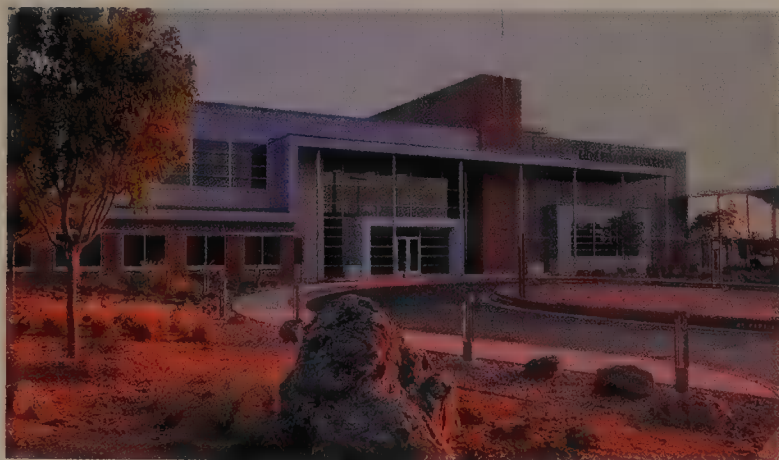
CNI is also the largest shareholder of Ekso Bionics, a company that has been a pioneer in the field of robotic exoskeletons since 2005. Its first commercially available product—a wearable robot called Ekso—has already helped thousands of people living with paralysis take millions of steps that would not have otherwise been possible.

BUSINESS FRIENDLY, BUSINESS AFFORDABLE

The reasonable cost of living and doing business in the state is another attractive

recruitment tool. In 2014, CNBC ranked Oklahoma the number one state in the nation in terms of cost of doing business, and the Frazier Institute's Global Petroleum Survey 2014 listed the state as "The Best Place in the World to Do Business in Oil and Gas."

"Oklahoma has the third-lowest cost of utilities in the nation, and our electricity costs are 30% lower than those of the rest of the nation," says Snodgrass. "Not only do we have affordable utilities, we have an abundant supply." Tort reform, lawsuit reform, workers' comp reform and the adoption of Right to Work have also helped put Oklahoma first in terms of business costs.



The University of Oklahoma's Research Campus co-locates university, governmental and private sector programs and entities in a large intellectual learning community where each benefits from the participation of the other. In only a decade, nine buildings have been constructed, anchored by The National Weather Center.

The OU Research Campus has been certified by the Oklahoma Department of Commerce as Site Ready, which enables site selectors to readily find quality land and facilities that meet nationally established criteria in a timely fashion and enables the university to capitalize on fast-moving economic opportunities. Two years ago, the Association of Public and Land-grant Universities designated OU among 15 public institutions as Innovation and Economic Prosperity Universities. The designation acknowledges universities working with public and private sector partners in their states and regions to support economic development through such activities as innovation and entrepreneurship, technology transfer, talent and workforce development, and community development.



OU: OKLAHOMA'S ECONOMIC ENGINE



- OU's Research Campus in Norman was named the No. 1 research campus in the nation, placing it among such past recipients as the Research Triangle Park in North Carolina, Purdue Research Park in Indiana and University City Center in Pennsylvania.
- OU's Research Campus has been transformed from an empty field to a 277-acre campus of community, public and private-sector collaborations located in nine buildings.
- Today, 1,700 university, government and industry employees reside on the Research Campus anchored by the National Weather Center, which houses OU's academic and research programs in meteorology and the National Oceanic and Atmospheric Administration's Norman-based weather, research and operations programs.
- OU is classified by the Carnegie Foundation as a Very High Research Institution, placing it in the highest tier of research universities in the nation.
- This designation is one of the most important measures that distinguish among institutions of higher education, and as the only Very High Research Institution in Oklahoma, OU is a foundational engine for economic growth because proximity to an outstanding research university is among the most important factors for those making business startup or relocation decisions.
- The University's Research Park at the OU Health Sciences Center in Oklahoma City fosters the continued growth and expansion of biomedical research and related commercial efforts that further health care in Oklahoma. The park is one of the state's major engines for economic growth and a vital resource for learning, discovery and innovation in today's knowledge-based, technologically driven, global society.
- To improve teaching, research, skill development and entrepreneurship with innovation equipment, spaces, programs and experts, OU is creating a 25,000-square-foot Innovation Hub, which will include a 5,000-square-foot digital fabrication lab. The Innovation Hub will be located on OU's Research Campus.
- The Center for Economic Wealth at OU is an economic development organization specializing in technology commercialization, software business development, social entrepreneurship and product design. The center provides students with opportunities to engage in real-world, high-impact projects working with university researchers and private-sector mentors.
- OU has the academically highest ranked student body at a public university in Oklahoma history.
- OU ranks No. 1 in the nation among both public and private universities in the number of freshman National Merit Scholars, with 313 scholars in the fall 2014 class.

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"When we moved our workers' comp system from a court-based system to an administrative system, we reduced cost by more than 20% in two years," Snodgrass explains. "Also, our labor cost is 20% lower than that of the rest of the nation."

"At the end of the day, businesses are looking to keep as much of their money as they can without having to spend it on taxes, labor costs or lawsuits," she adds. "Oklahoma offers that kind of environment."

KEEPING THE LIGHTS ON

Low utility costs and the abundance of utilities make the state attractive to new and expanding industry.

The Grand River Dam Authority (GRDA) is a self-supporting state agency that sells electricity and water resources to municipalities, industry and electric cooperatives. The GRDA operates three hydroelectric dams and two thermal-generation (coal-fired) units, owns a 36% interest in the Redbud Electrical Plant in Luther, is constructing a new natural gas plant near Chouteau, and owns more than 1,200 miles of high-voltage lines.

The GRDA is the majority supplier of electrical service to the MidAmerica Industrial Park (MAIP) in Pryor, a 9,000-acre facility (with 3,500 acres available). MAIP, one of the nation's largest industrial parks, is home to 80 companies ranging from two-person enterprises to leading national corporations.

"Google is a perfect example," says Snodgrass. "They are a major data center located at MAIP, so utility rates are very important. The top costs for manufacturers and industry are usually labor and utilities."

Because of the abundance of energy in Oklahoma, those costs are much lower than the rest of the nation.

"We offer low-cost utilities, and that provides an incentive to locate in our state," says Justin Alberty, GRDA corporate communications director. "When you have low utility costs, that draws a lot of new industry, but we also have abundant water."

EDUCATION AND WORKFORCE DEVELOPMENT

Educating Oklahoma's youth and developing them for the most in-demand jobs remains one of the state's primary goals. It's an issue that Governor Fallin has championed through initiatives like Oklahoma Works, which promotes innovative private/public partnerships that help schools teach industry-relevant skills to students.



Oklahoma's CareerTech—a model used nationally for its programs and services—trains the local labor force to meet the skills needed for businesses and industry.

"When it comes to economic development and workforce development, both higher education and CareerTech have a place at the table when we pitch to new industry," says Snodgrass. "CareerTech is often there, saying, 'We will train your people to your specification.' It's a collaboration."

Higher education institutions such as The University of Oklahoma (OU) in Norman are a foundational engine for economic growth due to its research diversity. OU's Research Campus is a 277-acre campus of community-, public- and private-sector collaborations.

"Oklahoma's university system is the largest single engine for economic development in our state," says OU President David L. Boren. "OU alone has an economic impact that approaches \$4 billion each year. In the last decade, it has helped to create more than 40,000 jobs in the biomedical field in our state."

The Association of University Research Parks named OU's Research Campus the number one research campus in the nation, positioning it on the same level as the Research Triangle in North Carolina and Purdue Research Park in Indiana.

"The university is not only a leader in support of the state's basic industries such as energy through its research and the training of highly qualified future employees, it is also a force for the economic diversification of Oklahoma," Boren says. "Economic diversification will provide

Because of the abundance of energy in Oklahoma, those costs are much lower than in the rest of the nation.

a more stable economic base for the state in the future. It is estimated that for every dollar the state government invests in OU, Oklahomans receive an eight-fold economic benefit in return."

TO LIVE AND PLAY

Oklahoma isn't just well known for its business-friendly environment—it's also famous as an outdoor adventure playground. Oklahoma has 12 unique environmental ecosystems and more than 200 lakes. According to Outdoor Industry Association, outdoor recreation activities in Oklahoma generate \$8.4 billion in consumer spending, 95,000 jobs with \$2.5 billion in wages and \$584 million in tax revenue.

The state's industries also contribute to the quality of life in Oklahoma.

Oklahoma City's Boathouse District, home to the Devon Boathouse—named for key sponsor Devon Energy—is a world-class rowing venue and popular visitor destination along the Oklahoma River. In addition to serving as an official U.S. Olympic training site for rowing, the district offers activities including a high-rise adventure course and zip



line, running paths, kayaking and—coming soon—a whitewater rafting facility.

"Devon is proud of the reputation we've earned for being thoughtfully engaged in the areas where we live and work, and that certainly includes Oklahoma," says Devon CEO Hager. "Our support through volunteerism

and civic participation contributes to building vibrant, educated, safe communities. And serving as a force for good in our communities is clearly good for Devon, too."

The Chickasaw Nation also is making a significant investment in the tourism industry. In recent years, the tribe completed

These are the **benefits** of **GRDA** **electricity** **service** **across** **Oklahoma**. **For** **nearly** **75** **years**, **GRDA** **has** **been** **providing** **"power** **for** **progress"** **to** **help** **business** **and** **industry** **grow**, **while** **helping** **to** **enhance** **the** **quality** **of** **life** **across** **Oklahoma**. **From** **the** **Mid** **West** **area** **hydro** **electric** **plants** **operating** **where** **GRDA** **is** **the** **primary** **electric** **supplier** **for** **industry** **and** **manufacturing**, **to** **Major** **Steps** **in** **making** **Oklahoma** **Energy** **Secure**, **customer** **benefiting** **from** **GRDA** **power** **can** **be** **found** **all** **across** **the** **state**.

With **wholesale** **electricity** **rates** **at** **least** **20** **percent** **lower** **than** **the** **national** **average**, **a** **diverse** **electric** **generation** **portfolio** **including** **coal**, **gas**, **hydro** **and** **wind** **resources**, **and** **a** **superior** **customer** **service** **history**, **GRDA** **is** **providing** **a** **lower** **cost** **option** **for** **business** **and** **industry** **looking** **to** **improve** **the** **stability** **of** **their** **electric** **power** **in** **America's** **heartland**.

GRDA
Grand River Dam Authority

RELIABLE

LOW COST

LOCAL CONTROL

ABUNDANT

DIVERSE

www.grda.com



several projects, including the Chickasaw Cultural Center and the Artesian Hotel in Sulphur, the Chickasaw Retreat and Conference Center, Chickasaw Nation Welcome Center, Chickasaw Visitor Center, and Bedré Fine Chocolate in Davis.

The Chickasaw Nation recently implemented the Adventure Road tourism

campaign, which promotes more than 200 destinations, attractions and activities near Interstate 35. This includes tribal and privately owned businesses, hotels, restaurants, bed and breakfasts, state parks, museums, entertainment venues and more.

The Chickasaw Nation also recently broke ground on an information center in

Tishomingo, which will serve as a gateway for the many attractions in this historic section of the Chickasaw Nation, including the Chickasaw Capitol Building and Council House Museum, Chickasaw White House, Tishomingo National Wildlife Refuge and Blue River.

"We have seen that Native American culture is important to many of those who visit Oklahoma since we opened the Chickasaw Cultural Center in July 2010," notes Anoa-tubby. "More than 350,000 people from around the world have visited the cultural center, and we believe Adventure Road will help business owners and communities in this region leverage the unique experiences to foster growth in tourism and economic development."

With endorsements and top rankings from Forbes, CNBC and more, as well as Oklahoma's low cost of living, the business climate in the state has never been better.

FOR MORE INFORMATION, VISIT
WWW.OKCOMMERCE.GOV

CHICKASAW

CULTURAL CENTER

Experience a vibrant culture at this acclaimed international destination. Award-winning exhibits, world-class art. Expansive grounds and proud Chickasaw traditions. Come share the fire. ChickasawCulturalCenter.com

CHICKASAW
CULTURAL CENTER

AdventureRoad.com
Travel Partner

Sulphur, OK

WAITING FOR GODOT IN BONDS



LIKE THE CHARACTERS in *Waiting for Godot*, a play in which the highly anticipated arrival of Godot never occurs, investors who have prepared for an imminent rise in interest rates continue to be disappointed. Unlike Godot, rising rates will show up someday. When that day does arrive, what does it mean for fixed-income portfolios, and what action should investors take now?

Investors should, at the very least, be aware of the relationship between interest

rate movements and bond prices. Generally speaking, the price of a bond moves inversely to changes in interest rates. Interest rates up, bond prices down—and vice versa. Duration represents an estimate of the magnitude of how the price of a bond will react to a change in interest rates. A higher duration implies greater price sensitivity should rates rise, a lower duration the opposite.

Most investors probably have the bulk of their fixed-income exposure in open-end mutual funds and exchange-traded funds rather than individual bonds, and many assume that a lower-duration fixed-income instrument must convey more “protection” from rising rates than a higher-duration bond. This is not always the case.

SHORT-DURATION BONDS ARE NO CURE-ALL FOR RISING RATES

The duration of a bond is primarily affected by its coupon rate, yield and remaining time to maturity. All else being equal, if we were to compare changes in coupon, yield and maturity on two similar bonds the following statements would be true: If the coupon and yield are the same, duration increases with time left to maturity; if the maturity and yield are the same, duration increases with a lower coupon; and if the coupon and maturity are the same, duration increases with a lower yield.

As a bond's price and yield fluctuate, so does its duration. Bonds paying higher interest rates, or coupons, are less interest rate sensitive than bonds with smaller coupons. Of course, stock prices are impacted by interest rate changes as well. However, they are generally less sensitive, because they have no maturity date.

So all you have to do to protect yourself against rising rates is (1) sell all your bonds and purchase equities or (2) purchase only bonds with low durations. Right?

Not so fast.

Never before has a rally in the U.S. stock market gone on this long without a Fed interest rate increase. If history is any guide, stock valuations are unlikely to continue rising in the face of a Fed rate-tightening regime. According to data compiled by Goldman Sachs and Bloomberg, P/E ratios contracted by an average of 7.2% in the quarter after the last 12 tightening cycles began.

What about buying bonds with lower durations? Since 2008 that's been a terrible strategy. Setting aside default risk, the “losses” due to rising rates are realized only when securities are sold. Bond investors have historically been more concerned with income than capital gains. Remember, just because the price of your bond has declined, what you have really purchased is a cash-flow stream that under normal circumstances should continue, absent an event of default. So, if you had shortened your duration for the past six years, the result would have been a greatly reduced cash flow for many years and the loss of the compounding of that cash flow.

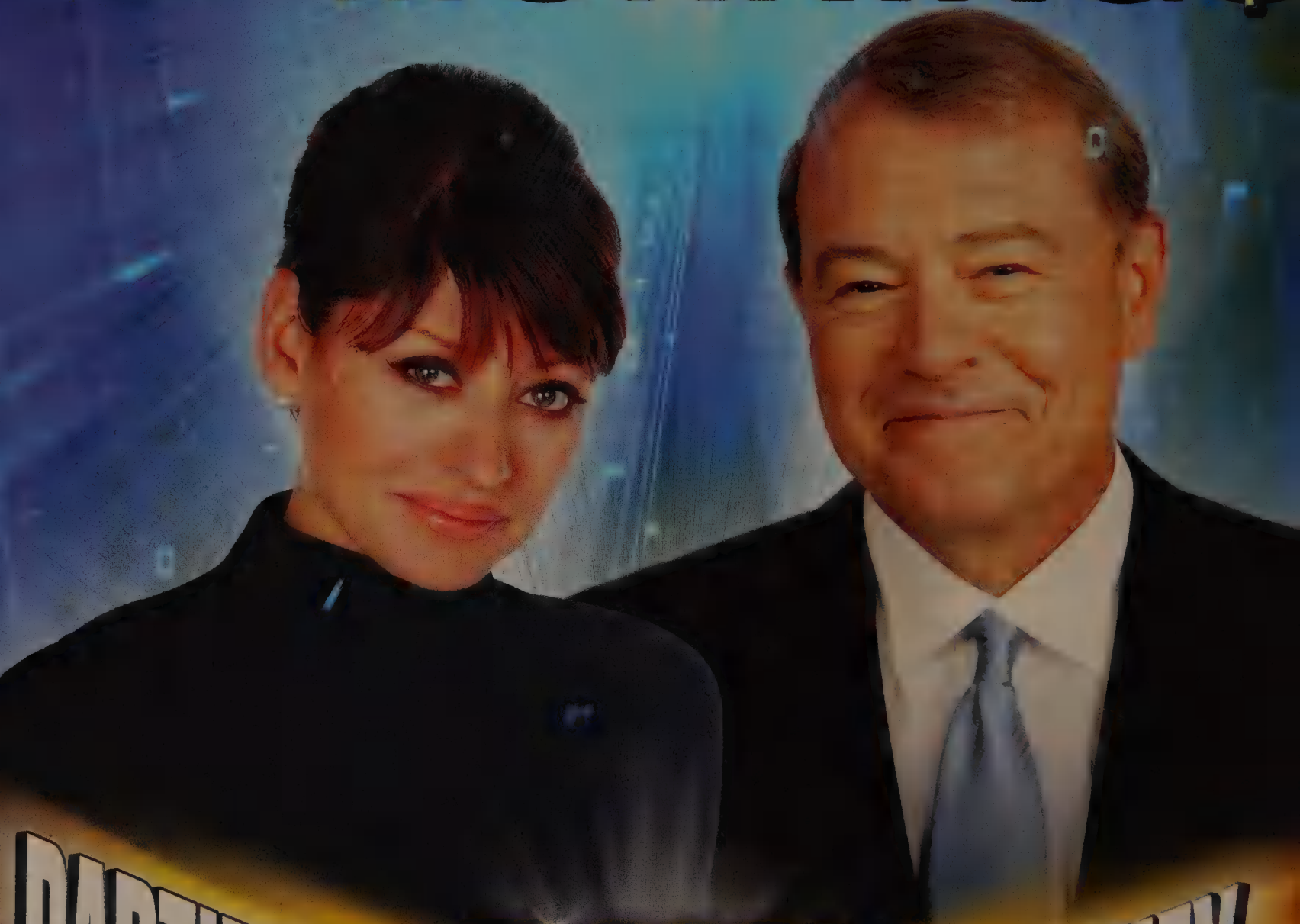
In fact, the greatest contribution to returns over the life of a bond is the reinvestment of coupon interest. Buy quality bonds in a laddered maturity portfolio where rising rates can work in your favor. Obsessing over duration without considering credit risk, especially with regard to high-yield corporate bond funds, is foolhardy.

Junk bonds have understandably gained popularity in the current low-rate environment. Some investors are even buying below-investment-grade corporates with a high yield to call under the assumption that they will be redeemed early. What if they're not? Then you have something called extension risk. That bond with a two-year duration now extends out in time.

Remember, the point of a bond portfolio is to generate income, but if that income stream ceases due to a default you not only lose your income, but you're stuck with a security that's in financial purgatory, whose maturity, just like Beckett's Godot, will never arrive. 

MONEY MANAGER BONNIE BAHA IS DIRECTOR OF GLOBAL DEVELOPED CREDIT AT DOUBLELINE CAPITAL LP IN LOS ANGELES.

POWERFUL MORNINGS\$



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FOX
BUSINESS
network

VARNEY

6AM^{ET}

9AM^{ET}

THE POWER TO PROSPER

12 Features

September 7, 2015

THE WORLD'S 100 MOST
INNOVATIVE COMPANIES 104

WALL STREET SLOWS DOWN 124

FALSE HOPES, ART SCHOOL AND THE
\$800 MILLION FAMILY 134

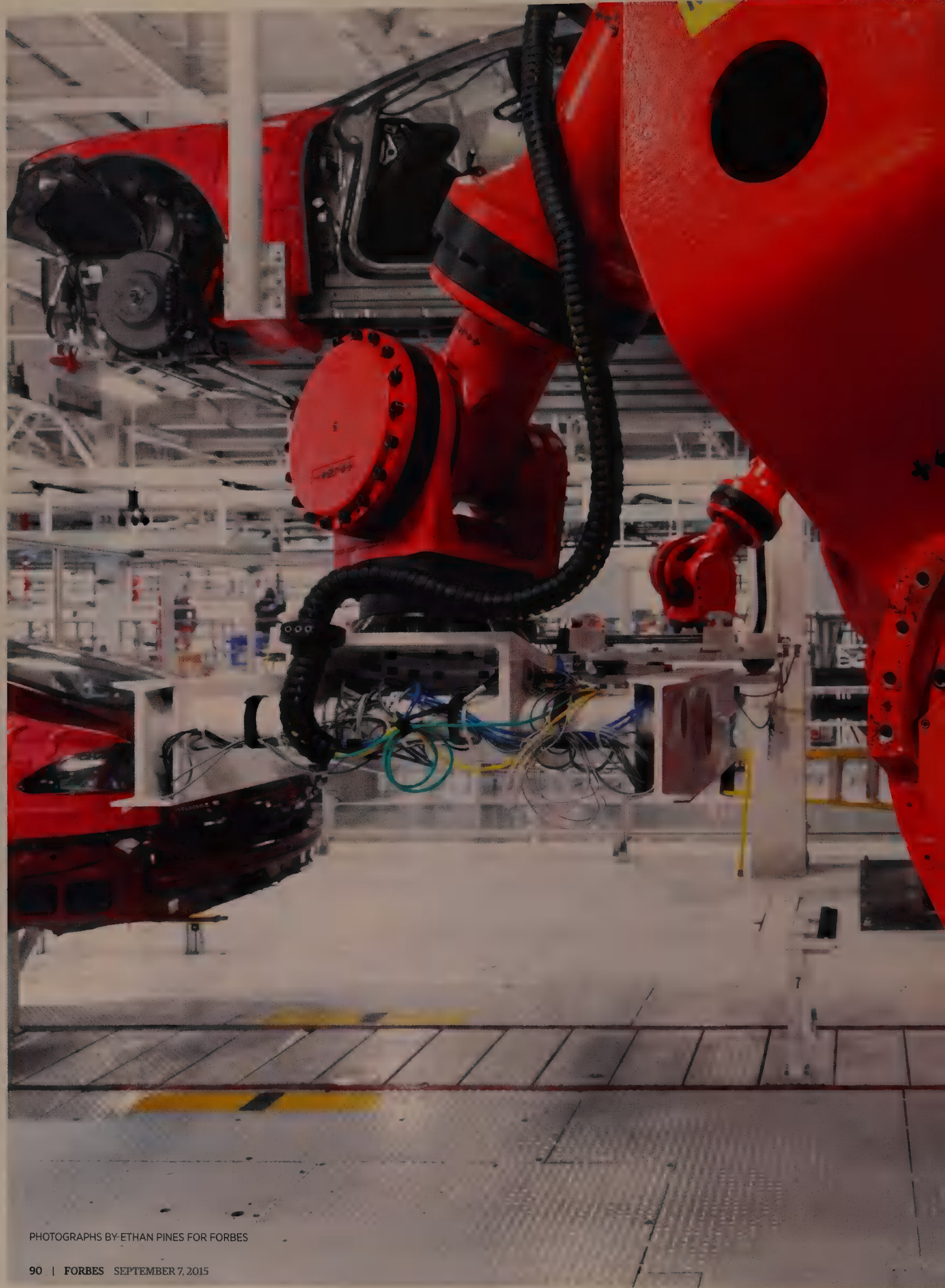
BrandVoice
WITH OPPENHEIMERFUND

GOING LONG ON INNOVATION 92

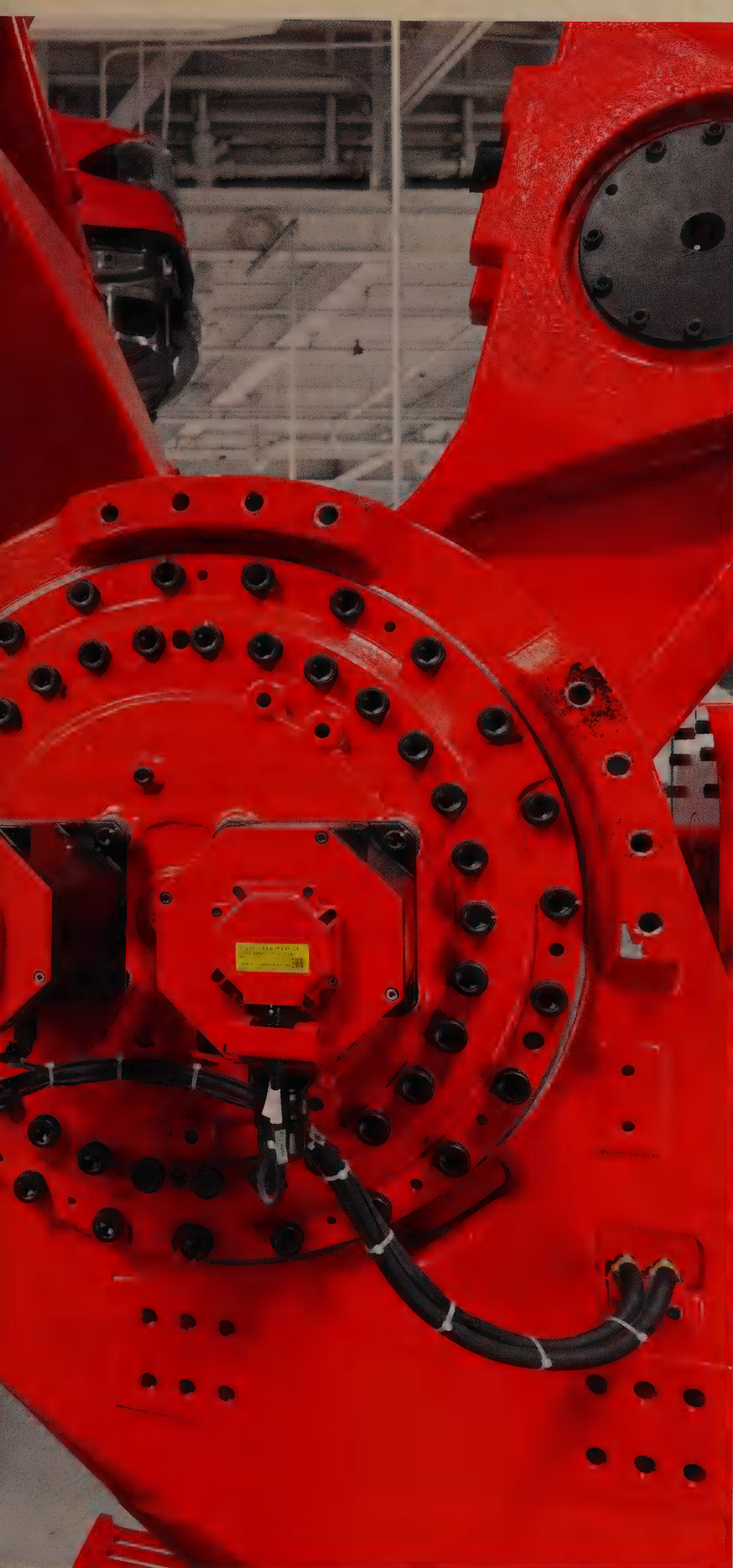
"I thought it would fail. The odds of car companies
succeeding are low, rocket companies even lower.
I didn't want to lose other people's money."

—ELON MUSK, ON NOT RAISING OUTSIDE CAPITAL IN TESLA'S EARLY DAYS

PAGE 90



PHOTOGRAPHS BY ETHAN PINES FOR FORBES



INNOVATORS

TESLA'S SECRET FORMULA

Elon Musk has inherited Steve Jobs' mantle as the cult favorite CEO. And his electric car company has grabbed Apple's creative crown. An inside look at the world's most innovative company.

BY JEFF DYER, HAL GREGERSEN
AND NATHAN FURR

The first thing you notice when you step onto Tesla Motors' production floor are the robots. Eight-foot-tall bright-red bots that look like Transformers, huddling over each Model S sedan as it makes its way through the factory in Fremont, Calif., on the eastern, shaggier side of Silicon Valley. Up to eight robots at a time work on a single Model S

GOING LONG ON INNOVATION

***OVER THE LONGTERM,
THE CONDITION OF
A BIGGER AND BIGGER
PROPORTION OF THE
WORLD'S POPULATION
HAS GOTTEN BETTER.
I SEE NO REASON WHY
THAT WILL CHANGE."***

— George Evans

Chief Investment Officer of Equities
OppenheimerFunds

Quality of life has undeniably improved for billions of people throughout history, a trend that is only accelerating. Amid an ongoing innovation revolution, now is as good a time as any to be optimistic about the future.

At the heart of this transformation sit well-established businesses that value innovation as integral to their long-term strategies, convinced that today's R&D dollars will produce tomorrow's blockbuster products.

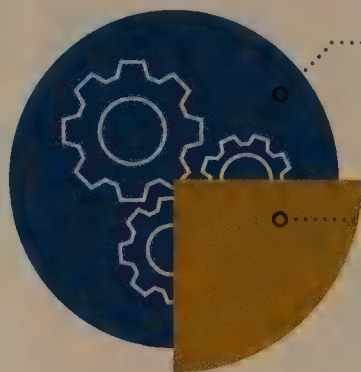
Two companies that have embraced this philosophy of innovation are Airbus, the European aeronautics company, and cruise ship operator Carnival.

\$1.1 TRILLION

spent on R&D in some of the world's
most advanced economies

\$330 MILLION

spent on R&D in the BRIICS
(Brazil, Russia, India, Indonesia,
China and South Africa)



\$647 BILLION INVESTED

in corporate R&D last year

\$165 BILLION INVESTED

in R&D by the world's 20 public companies
that spend the most on innovation



2.6 MILLION

patents filed globally
in 2013



2.6% GROWTH

in corporate R&D
over the last two years

**Breakdown
of Global R&D
Spending**



37.2%

United States

27.1%

European Union

11.2%

BRIC countries
(Brazil, Russia,
India, China)

24.5%

Rest of
the world

NEVER ON AUTOPILOT, AIRBUS SOARS TO NEW HEIGHTS

Airbus operated as a truly “globalized” company decades before the word entered the general vernacular.

Airbus now presides over a truly borderless supply chain comprising more than **2,000 suppliers** from nearly two dozen countries. Its assembly lines have similarly expanded to places such as Mobile, Alabama, where the company will soon open a **\$600 million** facility, and Tianjin, China.

To meet burgeoning demand, Airbus is also overhauling its Tianjin outpost to include a completion center for the A330 plane.

Airbus’ strategic outlook is helping the company compete in a commercial aircraft market that’s expected to deliver more than **\$120 billion** worth of planes in 2016.

\$3.72 BILLION

spent on R&D in 2014

↑ 9% from previous year

1,000 PATENTS

filed in 2014

ALSO THE LATEST AIRBUS MODEL

25% LESS FUEL BURN

than equivalent aircraft models

OVER 780 ORDERS

from 40 customers worldwide

9,000TH JETLINER DELIVERED

in March 2015



DESTINATION INNOVATION: CARNIVAL'S NEXT PORT OF CALL

9 UNIQUE CARNIVAL BRANDS

10 NEW SHIPS

set to enter the fleet over the next three years



1 BILLION GALLONS OF FUEL

saved since 2007



48%

of the global cruise market

\$2.5 BILLION

in 2014 capital expenditure

Carnival’s latest cruise line, Fathom, proves that the world’s largest travel and leisure business continues to define what cutting edge means.

Focused on “impact travel,” Fathom blends travel with meaning, enabling vacationers to take part in a more immersive travel experience. The **710-passenger Adonia** will set sail for Amber Cove, Carnival’s **new \$85 million port facility** in the Dominican Republic, where Carnival has invested in proven impact partners with strong community ties. Throughout their stay, travelers will work alongside members of those communities, immersing themselves in the unique culture. Up next, Fathom will set sail for Cuba in 2016.

Amid shifting consumer preferences, Carnival is confident that Fathom will attract those hungry for a new, profound kind of vacation.

The views above are those of Forbes Brand Productions, and the mention of specific companies should not be considered a recommendation or solicitation to purchase or sell those companies.

OppenheimerFunds Voice: To learn more about investing in innovation visit forbes.com/oppenheimerfunds.

TESLA

in a choreographed routine, each performing up to five tasks: welding, riveting, gripping and moving materials, bending metal, and installing components. Henry Ford and the generations of auto industry experts who have followed would dismiss this setup as inefficient—each robot should do one task only before moving the car on to the next Transformer.

It's a \$3 billion criticism, to be specific. That was the amount shaved off the company's market value in early August after Tesla cut its sales forecasts for the year by 10% to 50,000 vehicles, citing delays in teaching the robots to make both the Model S and the new crossover SUV Model X. "The Model X is a particularly challenging car to build. Maybe the hardest car to build in the world. I'm not sure what would be harder," admitted Elon Musk, Tesla's bil-

lionaire founder and visionary CEO, who also serves in those same roles at SpaceX.

But neither delays nor the cash burn (\$1.5 billion in the past 12 months) particularly phases Musk. He just wants to focus on making the world's best car, and the \$90,000 Model S, by all rights, can claim that prize. An all-electric vehicle, it offers a week's worth of driving on a single charge from any one of a nationwide network of free solar-powered charging stations. It goes from 0-60 in under three seconds in "ludicrous" mode, the fastest of any four-door production car on the planet, and is also the safest car in its class. When it collides with the crash-test machine, the crash-test machine breaks. You can order it online and have it delivered to your door, get software updates beamed wirelessly and receive maintenance alerts before bad stuff

happens. Plus, it's beautiful. The door handles reach out to be opened as you approach, then fold flat for better aerodynamics. Don't believe us: *Consumer Reports* called it the best overall car on the market for the past two years.

These are the kinds of superlatives that shoot Tesla Motors to the top of FORBES' World's Most Innovative Companies list in the first year we've had enough financial data to consider the company. The word "disruptor" gets attached to Tesla all the time. For several years we've closely studied the phenomenon of disruptive innovation, identified in the late 1990s by Harvard Business School's Clayton Christensen. We quantify it, based on the difference between a public company's market value and the measurable intrinsic value of its existing business—an innovation bonus, if you will. Despite all the buzz—and



Long way to go: Elon Musk wants the whole  industry to go electric. His market share today? Just 0.06%.

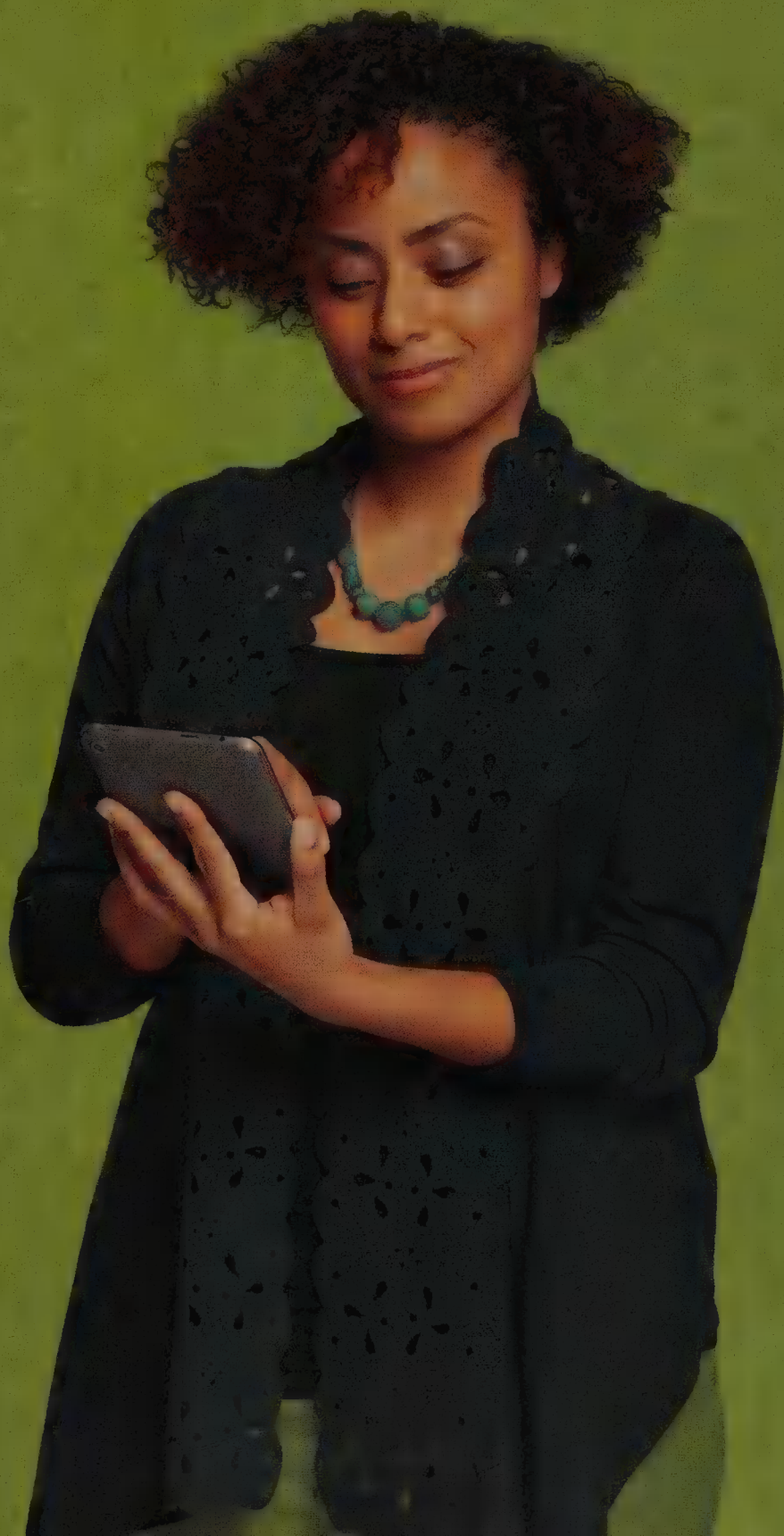
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Microsoft Cloud

TESLA

that's something we try to factor out when measuring the premium—we were initially puzzled by Tesla's growing success. Unlike classic disruptive innovations such as steel mini-mills, personal computers and, in the car business, cheap Japanese imports, Tesla never pursued the classic route of going after low-end, price-sensitive customers first with cheaper, inferior technology. It doesn't pursue nonconsumption, or customers who don't currently drive cars. Tesla automobiles look and drive much like other cars, use established infrastructure like roads and confine much of their product innovation to only one aspect: the power system.

These facts don't fit the required mold for successful low-end disruption—a traditional case study would point to Tesla hitting a wall. Even Musk wasn't sure at the beginning. "I didn't ask for outside money for Tesla, and SpaceX, because I thought they would fail," he says. But Tesla has instead proved to be a different kind of disruptor, a high-end version that can be just as troublesome for the incumbents.

High-end disruptors produce innovations that are leapfrog in nature, making them difficult to imitate rapidly. They outperform existing products on critical attributes on their debut; they sell for a premium price rather than a discount; and they target incumbents' most profitable customers, going after the most discriminating and least price-sensitive buyers before spreading to the mainstream. If you look within some large companies, you

can flesh out previous examples: Apple's iPod outplayed the Sony Walkman; Starbucks' high-end coffee drinks and atmosphere drowned out local coffee shops; Dyson's vacuum cleaners now have solid market share; Garmin's GPS golf watches have taken much of the business

from range finders. The incumbents didn't react fast enough, and the high-end disruptors took over their market.

Tesla has built its entire company around this idea. The Model S and X will be followed in 2017 by a cheaper Model 3, a \$35,000 Tesla

for the masses, if all goes according to plan. And despite the fact that Tesla abandoned its forecast of turning a profit this year (even with its unusual and pro-company lease accounting), investors can't get enough of it: Musk has raised \$5.3 billion in equity and debt for Tesla since 2010, with each round increasingly oversubscribed by investors, including a \$650 million secondary offering in mid-August, partly to complete its giant battery-making Gigafactory in the Nevada desert. "The willingness of the markets to support the company with various financing structures leads me to believe that everything will probably be okay, assuming the model proves viable," said Jacob Cohen, senior associate dean at the MIT Sloan School of Management.

That viability moment should come around 2017, say analysts at Credit Suisse, when Tesla is expected to show its first significant dose of free cash flow, or operating income after capital expenditures (*see charts, p. 102*). The other metrics look golden: It is on track to gross \$5.5 billion this year, up 54% over 2014. Its shares have soared 15-fold since its 2010 IPO to a recent \$33 billion market capitalization.

Meanwhile, incumbent automakers face the same

ONE-TRICK PONY NO MORE

TESLA IS LEARNING THE DIFFICULTY OF MAKING MULTIPLE MODELS AT ONCE. HERE'S THE LINEUP:



THE ROADSTER

RELEASE DATE: 2008. PRICE: \$109,000

Sold 2,500 before production ceased in 2012. An update may arrive in 2019.



MODEL S

RELEASE DATE: 2012. PRICE: \$90,000

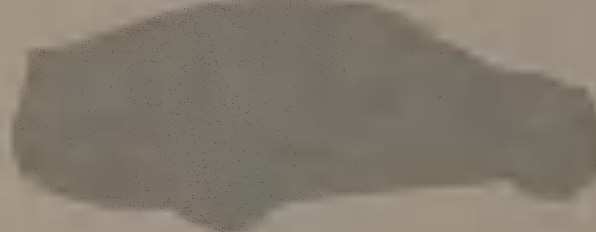
Named best car two years running by *Consumer Reports*.



MODEL X

RELEASE DATE: SEPTEMBER 2015. PRICE: \$90,000 (EST.)

Its first crossover SUV has gull-wing doors for better third-row access.



MODEL 3

RELEASE DATE: LATE 2017. PRICE: \$35,000

The linchpin of Musk's strategy: This is the electric car for the masses.

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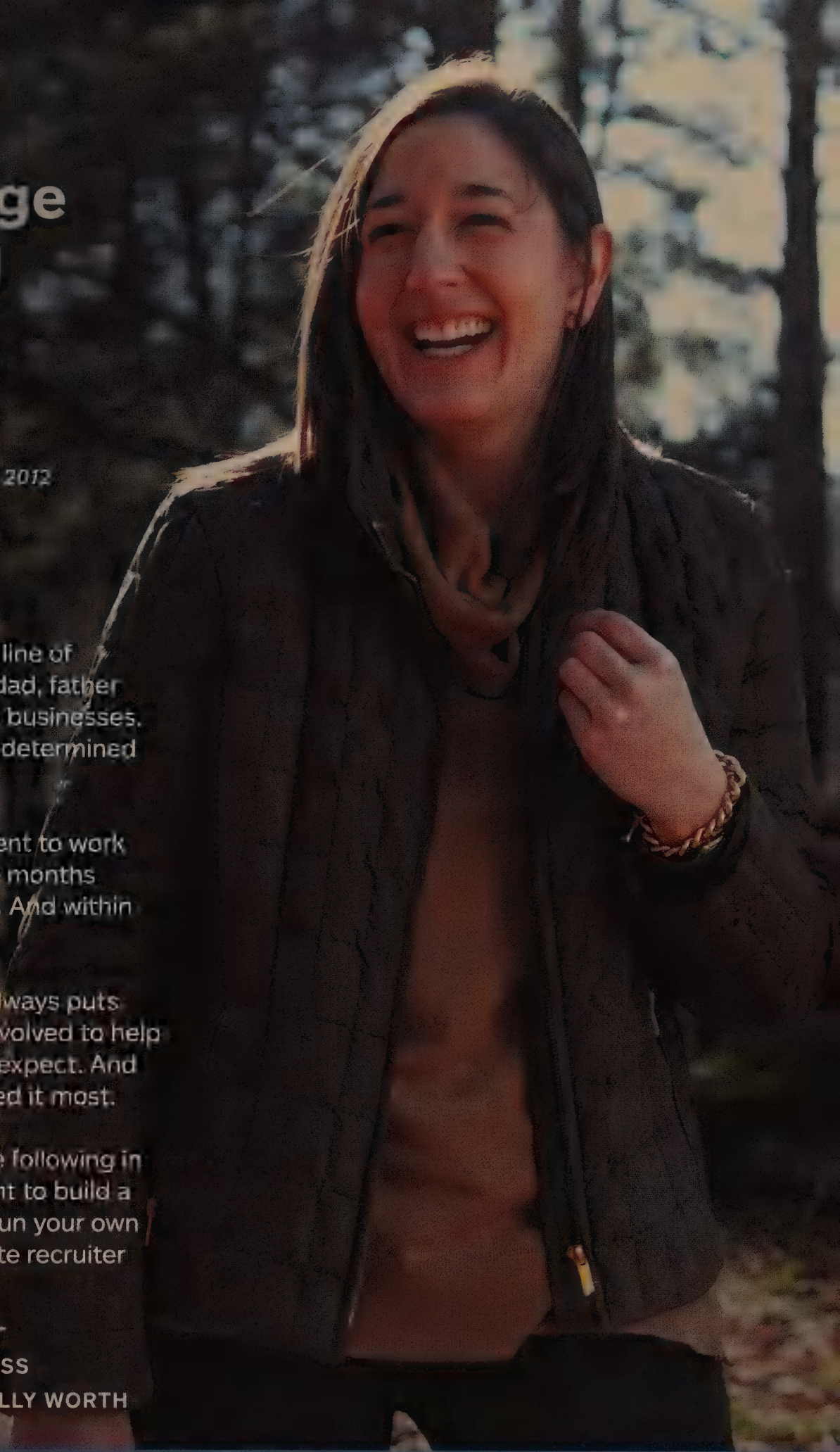
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LAS VEGAS

WHERE TECH MEANS BIG BUSINESS

BY BETH ELLYN ROSENTHAL

Every January, CES® comes to Vegas, demonstrating wildly creative, cutting-edge ideas that may become tomorrow's must-have technologies. The show earns its moniker: "The Global Stage for Innovation."

Gary Shapiro, president and CEO of the Consumer Electronics Association (CEA)®, the nonprofit trade association that produces CES, says its mission is to inspire innovation. And what better place to do it than Las Vegas?

Choosing Las Vegas

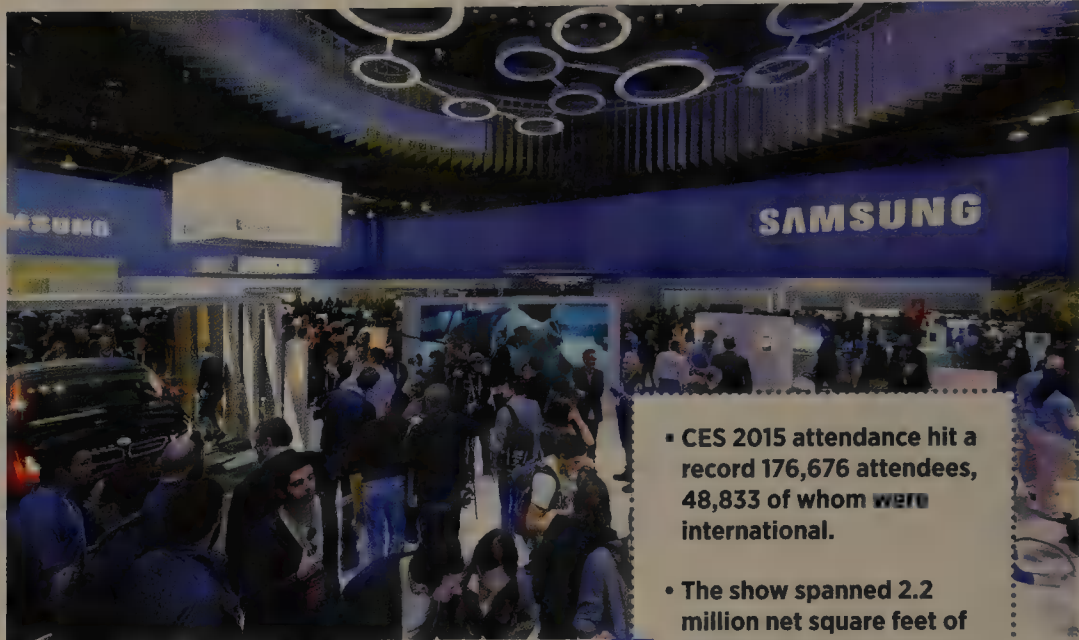
CES began in 1967 as a spin-off of the National Association of Music Merchants Show, which until then was the main consumer electronics industry event. However, according to Shapiro, Chicago got so cold in January 1977 that people couldn't leave their hotel rooms. Jack Wayman, Shapiro's predecessor, approached the Las Vegas Convention & Visitors Authority (LVCVA) about moving the January show.



Gary Shapiro
President and CEO
Consumer Electronics Association (CEA)®

"Moving to Las Vegas was a big risk," Shapiro recalls. "It was a controversial decision. Back then there were no big business conventions in Las Vegas." Through the years, that trend has certainly changed. In 2014, Las Vegas hosted 22,103 conventions, drawing some 5.17 million visitors, according to the LVCVA.

Shapiro says the gamble paid off: CES has grown in attendance almost every year since it made the move. Just 17,000 people attended the first show, while last year's show welcomed



- CES 2015 attendance hit a record 176,676 attendees, 48,833 of whom were international.
- The show spanned 2.2 million net square feet of exhibit space to showcase its consumer technology ideas.
- CES 2015 took 18 days to set up, run and take down.

an impressive 176,676 attendees. Shapiro says the show has grown so popular that CEA is actually capping attendance in 2016.

Why Do Business in Vegas?

"Las Vegas is for business," Shapiro explains. From experience, he can attest that in most other cities, "the convention business is an afterthought; in Vegas, meetings are a priority. Everything about the city reflects this attitude, and its hospitality nature is unparalleled.

"It is also increasingly easy to do business in Vegas," says Shapiro, reflecting on the city's top-notch infrastructure. In addition to having a world-class airport (with free Wi-Fi), Vegas offers three of the U.S.'s ten largest convention centers. Logistically, the city really couldn't make things easier, he adds, noting that "everything is in one area. The airport is close to the hotels, and they are close to each other and to the convention centers."

CEA works with the city of Las Vegas and the LVCVA to create a cleaner, greener experience for attendees. Over the course of the 2015 International CES, CEA collected a record 209,532 square feet of show materials and graphics to recycle and repurpose, recycled returned show badges into hotel room keys, and returned 95% of the show floor carpeting for reuse.

And, of course, Vegas has always known how to entertain in style. "The reason trade shows exist is to get everyone together so they can meet efficiently. To do that, there's nothing better than great entertainment and

great food that everyone can share. Vegas allows that to happen," says Shapiro.

How the LVCVA Supports Business

The LVCVA "has been strategic for us," Shapiro reports, explaining that the organization has been especially helpful in attracting both business visitors and international participation—which of course is critical to a global trade show like CES.

"Vegas is ahead of other cities in its marketing and sales efforts. Even though the LVCVA has a fantastic product to sell, it doesn't rest on its laurels. It keeps pushing the envelope to help us grow and get the quality audience we want to attract."

Shapiro further appreciates the fact that the LVCVA is "so strategic and forward-thinking." In February, the LVCVA purchased the historic Riviera Hotel and Casino. It will use the 26-acre site for expansion of the Las Vegas Convention Center. "Las Vegas knows how to focus on its future," he says.

"Every show that comes to Las Vegas grows," Shapiro says. "We feel our success is tied to the success of Vegas."

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TESLA

challenge now and long term: If much of the auto business ends up going electric (and that's a big if right now with sub-\$3 gas and sales falling overall for electrics and hybrids) Tesla will be miles ahead at the high-end and coming down-market to eat away at the \$1 trillion industry. Detroit finds it easy to dismiss Tesla as a moneylosing startup, but it has changed the industry. "[In 2001] GM crushed all of its electric models in a junkyard," Musk says. "When we came along and made the Roadster, it got GM to make the Volt and then Nissan felt confident enough to go with the Leaf. We basically got the whole ball rolling with electrification of cars. The ball is rolling slowly, but it is rolling."

PEEL BACK THE ALUMINUM skin of a Tesla Model S and you will see what high-end disruption looks like. The motor and gearbox are a fraction of the size of a combustion engine drivetrain, mounted low between the wheels to create a larger crumple zone for passenger safety. The chassis is like a giant skateboard built to accommodate lots of battery wattage.

To create a car that looks this different, Musk has engineered a team



Tesla's chief designer, Franz von Holzhausen, is one of the few industry veterans under Musk.

and process that look different. Call it the Musk Way. Most car companies try to capture value with an established product. Laboring under radical uncertainty, Tesla has a process that is centered on a single purpose: speed. Like the big automakers, Tesla stamps its own body panels in-house, but it also makes its own battery packs and motors in the Fremont assembly plant. It even makes its own plastic steering wheel casings—a part easily and usually outsourced—because suppliers

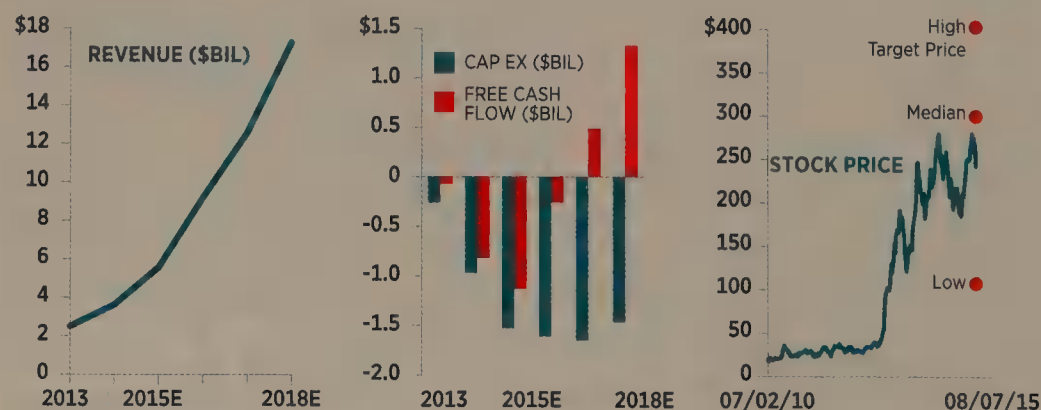
(much to their regret) tried sending their B teams and took months to turn around designs.

Tesla cannot wait—it updates designs continuously, borrowing ideas freely from its sibling SpaceX, including its extensive use of aluminum in both the body and the chassis of the Model S, as well as drawing and casting techniques used to produce the aluminum bodies of SpaceX's Falcon rocket and Dragon capsules. "It's very helpful to cross-fertilize ideas from different industries," says Musk.

You'll rarely find someone at Tesla who worked at GM, Ford or Chrysler or an automotive supplier (Aston Martin is one notable exception). Sterling Anderson, a former McKinsey associate and MIT-trained expert in self-driving cars, was hired in the summer of 2014 to work on Tesla's autopilot systems. Now he's the program manager of the Model X. The reason Tesla will occasionally put someone in a position without prior industry experience is that Musk is known for selecting people based upon their ability to solve complex problems—not

SPEND MONEY TO MAKE MONEY

WALL STREET OPINION VARIES WIDELY OVER TESLA'S FUTURE VALUE AND WHEN IT WILL BEGIN GENERATING FREE CASH. THE LATTER MAY NOT COME FOR A YEAR OR TWO.



SOURCES: CREDIT SUISSE, FACTSET

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TESLA

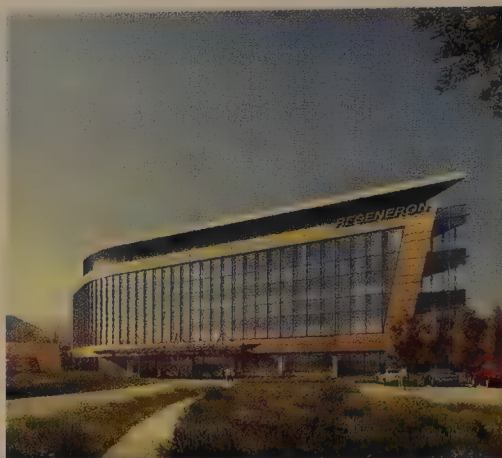
based upon experience. Says Tesla Chief Information Officer Jay Vijayan, “Elon doesn’t settle for good or very good. He wants the best. So he asks job candidates what kinds of complex problems they’ve solved before ... and he wants details.”

Musk’s team screens job applicants for their ability to learn under uncertain conditions. Every new employee, no matter which department, has to have proven some kind of ability to solve hard problems. “We always probe deeply into achievement on the résumé,” says Musk. “Success has many parents, so we look to find out who really did it. I don’t care if they graduated from university or even high school.”

Promotions and bonuses at both Tesla (and SpaceX) are built around a 1-to-5 rating system, with 4 and 5 being “great” and “phenomenal,” respectively. “You don’t get the two highest ratings,” says Musk, “unless you have done something innovative. It has to be significant in the case of phenomenal, something that makes the company better or the product better. Anyone can be an improver: HR, finance, production, they can all figure out how to improve things.”

When Tesla first called Vijayan to ask him to consider the CIO job, he said maybe but then pulled himself out of contention. He had a cushy CIO job at Silicon Valley blue-chip software firm VMware and wasn’t looking to step out on any ledges. Tesla appeared to be taking huge risks, and Elon Musk had a reputation of making monumental demands of the leadership team. But 18 months later he got a call back and was asked to reconsider. During his interview with Musk he became convinced this company could change the world.

Vijayan’s first major task? Build all the software to run the busi-



SPEEDING DRUG DISCOVERY

By year-end the Regeneron Genetics Center will have sequenced the exomes, or protein-coding genes, of 100,000 people.



DRONE TO YOUR DOORSTEP

Those who mocked Amazon’s air-delivery idea owe Jeff Bezos an apology. It’s already being tested in the U.K. and Canada.



THE BANGKOK SLURPEE KING

CP ALL has 8,500 7-Eleven stores in Thailand. Profits are up 32% this year. Its chairman, Dhanin Chearavanont, is part of Thailand’s richest clan.

RANK	COMPANY	INNOVATION PREMIUM
/2014 RANK		
INDUSTRY / COUNTRY		
1/*	TESLA MOTORS	84.82
AUTOMOBILES / U.S.		
2/1	SALESFORCE.COM	77.81
SOFTWARE / U.S.		
3/2	ALEXION PHARMA	72.50
BIOTECHNOLOGY / U.S.		
4/5	REGENERON PHARMA	72.13
BIOTECHNOLOGY / U.S.		
5/3	ARM HOLDINGS	69.76
SEMICONDUCTORS / U.K.		
6/4	UNILEVER INDONESIA	67.90
HOUSEHOLD PRODUCTS / INDONESIA		
7/*	INCYTE	67.85
BIOTECHNOLOGY / U.S.		
8/6	AMAZON.COM	67.64
ONLINE RETAIL / U.S.		
9/*	UNDER ARMOUR	66.56
APPAREL / U.S.		
10/7	BIOMARIN PHARMA	65.19
BIOTECHNOLOGY / U.S.		
11/58	BAIDU	64.66
INTERNET SERVICES / CHINA		
12/10	ASPEN PHARMA	63.96
PHARMACEUTICALS / U.S.		
13/14	MONSTER BEVERAGE	63.31
SOFT DRINKS / U.S.		
14/*	CATAMARAN	63.17
HEALTH CARE SERVICES / U.S.		
15/11	VERTEX PHARMA	62.39
PHARMACEUTICALS / U.S.		
16/*	FLEETCOR TECH	61.62
DATA PROCESSING / U.S.		
17/8	CP ALL	61.18
FOOD RETAIL / THAILAND		
18/*	VERISK ANALYTICS	61.01
DATA PROCESSING / U.S.		
19/16	RAKUTEN	58.81
ONLINE RETAIL / JAPAN		
20/*	SHANGHAI RAAS	58.50
BLOOD PRODUCTS / CHINA		

* - NEW

FROM BOTTOM: Kiyoshi Ota/Bloomberg; Peter Endig/DPA/Newscom

BEAUTIFUL IDEAS

Great ideas can arrive in a moment of inspiration, plucked out of the ether fully formed. More often, though, the muses don't pick up the phone. Innovation is mess and toil, and often found outside your four walls. "No matter who you are," said tech pioneer Bill Joy, "most of the smartest people work for someone else." The world's most innovative firms, whose ideas are featured here, will always admit brilliance is harder than it looks.



UNDER ARMOUR

PLAY MISTY FOR US

5-YR SALES GROWTH/ ~~5-YR~~ TOTAL RETURN: 270%/ ~~515%~~

Under Armour is closely linked to big, tough guys in sports, and only a third of its \$3 billion in 2014 revenue came from women's activewear. To grab more of that market from rivals Lululemon and Nike, the innovative apparel maker has been mounting a \$15 million ad campaign—its largest-ever aimed at women—that speaks to those who refuse to accept limits put on them by others. The "I Will What I Want" series began a year ago with an inspiring video of American Ballet Theatre's Misty Copeland that has racked up 9 million views on YouTube. Copeland, who started ballet at 13, was told she was too old and curvy, and not of the right race to be a prima ballerina. Now she solos to rave reviews. The video series continued with supermodel Gisele Bündchen and features print and digital spots with Olympic skier Lindsey Vonn, tennis player Sloane Stephens and soccer player Kelley O'Hara.



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your

competition

cuts?



MARRIOTT

GET LOUD IN THE LOBBY

5-YR SALES GROWTH: 5-YR TOTAL RETURN: 211% / 110%

Looking outside the hotel business for new ideas, Marriott recently collaborated with Netflix so guests at select hotels can stream their queue in-room and with GoPro to rent action cameras so tourists can record their adventures. Marriott and Universal Music Group set a roster of the label's artists to play exclusive performances in hotels around the globe. Ellie Goulding kicked things off in June with a raucous show at the St. Pancras Renaissance in London.



CHRIS JACKSON/BETTY IMAGE



KEURIG GREEN MOUNTAIN

MR. ICED COFFEE

5-YR SALES GROWTH/ 5-YR TOTAL RETURN: 287%/ 156%

Keurig needs a hit after a sales slump of its K-cups and brew machines. All eyes are on the new KOLD drinkmaker, a joint effort with Coca-Cola and Dr Pepper that makes chilled drinks, going after SodaStream's business. Expect it online and in selected stores this fall.

RANK	COMPANY	INNOVATION PREMIUM
/2014 RANK		
INDUSTRY / COUNTRY		
21 / 51	NAVER	58.22
INTERNET SERVICES / SOUTH KOREA		
22 / 13	HERMES INTL	58.17
LUXURY GOODS / FRANCE		
23 / *	MAGNIT	57.90
RETAILING / RUSSIA		
24 / 19	CHIPOTLE MEXICAN GRILL	57.87
RESTAURANTS / U.S.		
25 / 15	PRICELINE GROUP	57.06
ONLINE TRAVEL / U.S.		
26 / 12	RED HAT	55.97
SOFTWARE / U.S.		
27 / 26	NETFLIX	55.89
ONLINE MEDIA / U.S.		
28 / *	AMOREPACIFIC	55.29
PERSONAL PRODUCTS / SOUTH KOREA		
29 / 17	MARRIOTT INTL	55.21
HOTELS / U.S.		
30 / *	MEAD JOHNSON NUTRITION	54.89
PACKAGED FOODS / U.S.		
31 / *	VALEANT PHARMA	54.80
PHARMACEUTICALS / CANADA		
32 / *	VISA	54.76
DATA SERVICES / U.S.		
33 / 22	COLOPLAST	54.73
MEDICAL DEVICES / U.S.		
34 / 21	CERNER	54.05
HEALTH SOFTWARE / U.S.		
35 / 31	ILLUMINA	53.90
LIFE SCIENCES TOOLS / U.S.		
36 / 27	MASTERCARD	52.89
DATA SERVICES / U.S.		
37 / 20	STERICYCLE	51.43
ENVIRONMENTAL SERVICES / U.S.		
38 / 41	FAST RETAILING	51.42
RETAILING / JAPAN		
39 / 9	VMWARE	51.06
SOFTWARE / U.S.		
40 / 39	PERRIGO	50.84
PHARMACEUTICALS / U.S.		

* - NEW



YOU LOOK MARVELOUS

Hermès is up solidly in Asia despite a choppy economy. Its Rue de Sèvres store in Paris, opened in 2010 in an old natatorium, still stuns.



THE RED EMMY MACHINE

Netflix scored 34 Emmy nods (16 alone for *Orange Is the New Black*). Global subscribers hit 66 million, and the stock is up 150% this year.



BETTER WHEN SHREDDED

Stericycle gets rid of medical waste for hospitals and doctors and now, with its \$2.3 billion purchase of Shred-It, will trash your paper, too.

TESLA

ness, from scratch, in three months, for one-fifth the cost. Typically big companies spend millions of dollars on enterprise resource planning software—which handles product planning, finance, manufacturing, supply chain and sales—from large vendors like SAP and Oracle. When Vijayan told him such a task wasn't possible, Musk simply stated, with a Steve Jobs-like confidence: "Let me know what you need from my side to make this happen." Says Vijayan, "He doesn't accept constraints as 'givens' the way most people do."

Vijayan and his team implemented a basic but functioning home-grown system in four months, and with steady improvements it now gives Tesla a lightning-fast feedback loop. "We have a seamlessly integrated information system that gives us speed and agility like no other automaker," says Vijayan. By comparison, GM outsourced its entire IT function after spinning out EDS in 1996, and only since exiting bankruptcy has it rebuilt its IT strength, but at huge cost.

After hiring folks with a demonstrated ability to solve complex problems, Tesla deploys them in small teams that sit cheek-by-jowl to hasten the solutions. "Our communication allows us to move incredibly fast," says chief designer Franz von Holzhausen. "That is an element that isn't happening in the rest of the automotive world. They are siloed organizations that take a long time to communicate." Von Holzhausen was able to design the award-winning Tesla S with a team of just three designers sitting next to their engineering counterparts. Bigger automakers typically have 10 to 12 designers working on each new model.

Even the car itself is designed for speed of learning. Customers are continuously connected to Tesla via their car's 4G wireless connection

TESLA

and 17-inch touchscreen control panel, which sends usage data to the manufacturer in real time. Tesla will release fixes via overnight software download or make physical changes at a moment's notice. That ludicrous mode that shaves the zero-to-60mph time by 10% on the top-of-the-line P85D Model S sedan is available as an over-the-air \$10,000 software upgrade. And in 2013, after receiving feedback that the back seats in the Tesla S were uncomfortable, Tesla service workers changed every owner's seats in a matter of weeks, midyear.

LEARNING IN AN ENVIRONMENT of uncertainty requires a willingness to admit mistakes and move quickly rather than digging in and doing nothing for fear of admitting failure. In fact, obsessively attempting to avoid failure can lead to the greater failure of missing the big opportunity.

When the Model S was introduced in June 2012 it came with a "smart" air suspension system that automatically lowered the car at highway speed for better aerodynamics and range. One day a Model S owner was zooming down the highway and ran over a three-ball trailer hitch. It punctured the underbody's ballistics-grade armor and the battery pack above it with incredible force. No one was hurt; the car's warning system told the passengers to exit the vehicle before a fire started in the front compartment. Tesla quickly added a titanium underbody shield to the existing armor on all new cars and made it a free upgrade on existing ones, and it updated the software so the car doesn't automatically lower at highway speed.

Most automakers lay out their shop floor once to minimize costs and plan model lines that will remain unchanged for several years.



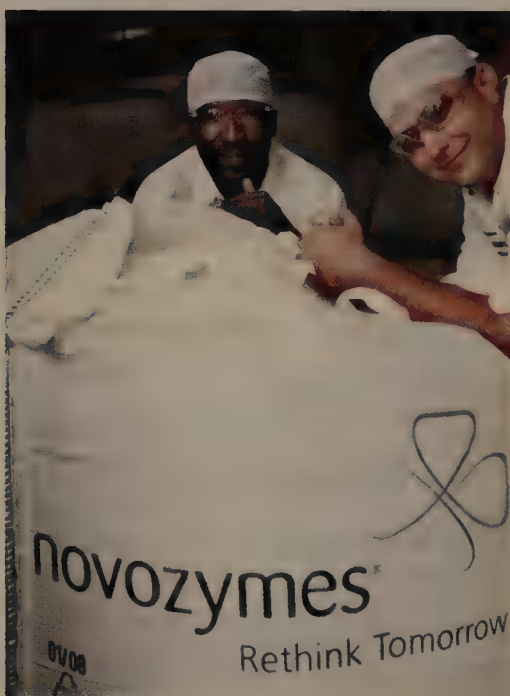
NO TREND LEFT UNSIPPED

Starbucks jumped into the cold-brew coffee game and will have the smoother, less acidic drink in 2,800-plus stores year-round.



CLEAN FEET

Reckitt Benckiser employees literally walked in customers' shoes to develop the new Scholl Velvet Smooth Express Pedi, which buffs away dead skin.



NO STARCH, PLEASE

Novozymes' new LpHera enzyme can cut in half the amount of chemicals used to liquefy starch, a huge component in food processing.

2014 RANK	COMPANY	INNOVATION PREMIUM
INDUSTRY / COUNTRY		

41 / 42 HINDUSTAN UNILEVER 50.78
HOUSEHOLD PRODUCTS /

42 / * TRANSDIGM 50.53
AEROSPACE & DEFENSE / U.S.

43 / 38 KEURIG GREEN MOUNTAIN 50.35
PACKAGED FOODS / U.S.

44 / 18 FASTENAL 50.00
DISTRIBUTION / U.S.

45 / 28 STARBUCKS 49.76
COFFEE SHOPS / U.S.

46 / * CIELO 49.75
DATA SERVICES /

47 / * ALMARAI 48.62
PACKAGED FOODS / SAUDI ARABIA

48 / 36 KONE 48.27
INDUSTRIAL MACHINERY /

49 / 25 ILIAD 48.03
TELECOM SERVICES / FRANCE

50 / 29 WHOLE FOODS MARKET 46.85
RETAILING /

51 / 34 UNICHARM 46.61
HOUSEHOLD PRODUCTS /

52 / 33 SBA COMMUNICATIONS 45.94
TELECOM SERVICES / U.S.

53 / 45 RECKITT BENCKISER 45.69
CONSUMER PRODUCTS / U.K.

54 / 69 AMERISOURCEBERGEN 44.95
HEALTH CARE DISTRIBUTORS / U.S.

55 / 70 TENCENT HOLDINGS 44.84
INTERNET SERVICES /

56 / 68 LINDT & SPRUENGLI 44.75
PACKAGED FOOD /

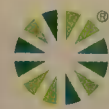
57 / * EXPEDIA 44.73
ONLINE TRAVEL / U.S.

58 / 23 AMBEV 44.64
BREWERS /

59 / 32 NOVOZYMES 44.62
SPECIALTY CHEMICALS /

60 / 59 CAPITA 44.60
HUMAN RESOURCE SERVICES / U.K.

- NEW



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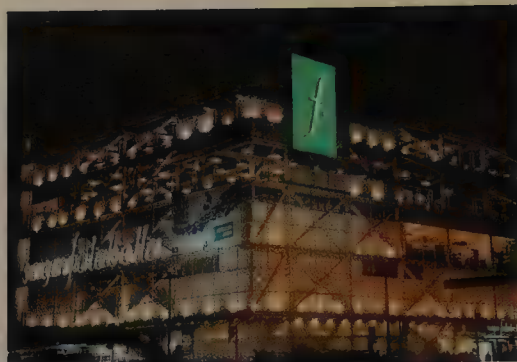
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Data • Voice • Cloud • Managed Services

TESLA

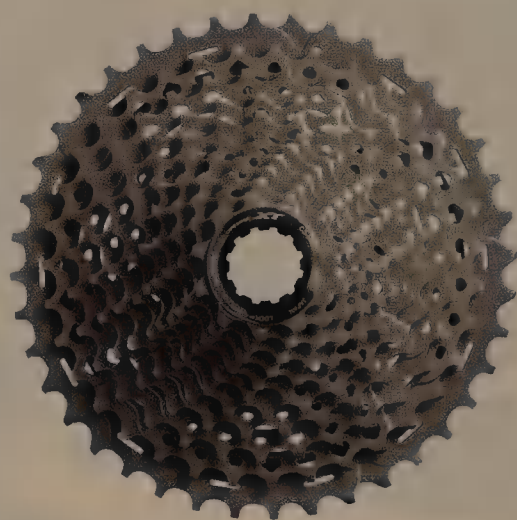
Tesla's production engineers are continually changing the layout of the factory to learn as much as possible. Over time, as Tesla wrings out the uncertainty in the development and manufacturing process, it will transition to a more familiar arrangement, a process that is already starting to happen in the second and third production lines for the Model S and Model X. Tesla learned the benefits of staying nimble early on with the Roadster when, in an effort to reduce costs, it tried to establish a global supply chain similar to a giant carmaker's. Tesla wasn't ready for that setup, and having manufacturing spread out over the world led to massive coordination problems. "We definitely don't get it perfect on the first try, not even close," says cofounder and chief technical officer J.B. Straubel. "But that's how we learn." The stakes will go way up when Tesla adds the future Model 3 on another production line. If one part isn't right, the whole factory can grind to a halt. FiatChrysler, for example, delayed the launch of the popular Jeep Cherokee by about six months because of problems with its new nine-speed transmission.

Tesla's innovation process is neither easy nor comfortable. A recent Musk biography tells the story of the time when, after asking already overworked employees to continue pulling overtime before the launch of the original Tesla Roadster, one employee said, "But we haven't seen our family in weeks." Musk's response: "You will have plenty of time to see your family when we go bankrupt." Musk also looks down on holidays, having nearly died from



ATENCION, LOS SHOPPERS

Falabella, controlled by Chile's Solari family, is in the midst of investing \$3.9 billion to open 230 stores and 20 malls in South America by 2017.



CLIMBING HIGHER

Japan's sports-gear maker Shimano keeps posting solid growth from new tech. Mountain bikers love its ultralight Deore sprockets.



SUN-POWERED FLIGHT

Dassault Systèmes' CAD software helped design and build the Solar Impulse 2, a fuel-less craft awaiting its next leg as it flies around the world.

RANK	COMPANY	INNOVATION PREMIUM
/2014 RANK		
INDUSTRY / COUNTRY		
61/62	FALABELLA	44.44
	RETAILING / CHILE	
62/47	ESSILOR	44.33
	MEDICAL EQUIPMENT / FRANCE	
63/53	KEYENCE	44.28
	ELECTRONIC EQUIPMENT /	
64/55	TATA CONSULTANCY	44.01
	IT SERVICES /	
65/49	LUXOTTICA GROUP	43.93
	EYEWEAR / ITALY	
66/24	EXPRESS SCRIPTS	43.90
	HEALTH CARE SERVICES / U.S.	
67/*	SHIMANO	43.31
	LEISURE PRODUCTS / JAPAN	
68/46	BROWN-FORMAN	43.23
	DISTILLERS / U.S.	
69/60	GEBERIT	42.92
	BUILDING PRODUCTS / SWITZERLAND	
70/*	JAZZ PHARMA	42.86
	PHARMACEUTICALS / U.S.	
71/89	SUN PHARMA	42.64
	PHARMACEUTICALS /	
72/*	SONOVA	42.55
	HEALTH CARE EQUIPMENT / SWITZERLAND	
73/80	AUTODESK	42.53
	SOFTWARE / U.S.	
74/131	ADOBE SYSTEMS	42.19
	SOFTWARE / U.S.	
75/44	HENGAN INTL	42.10
	PERSONAL PRODUCTS / CHINA	
76/54	DASSAULT SYSTEMES	42.03
	SOFTWARE / FRANCE	
77/43	TINGYI	41.57
	PACKAGED FOODS /	
78/57	DAIRY FARM INTL	40.91
	FOOD RETAIL /	
79/*	EQUINIX	40.90
	DATA CENTERS / U.S.	
80/81	INDITEX	40.72
	RETAILING /	

* - NEW

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Ohio

TESLA

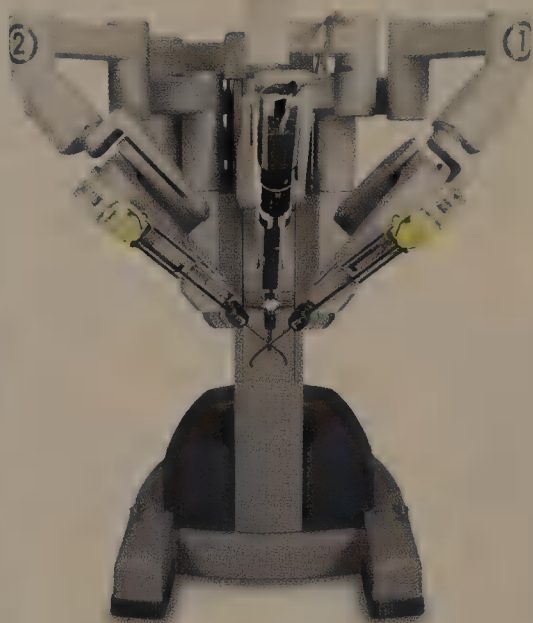
malaria following a trip to Brazil and South Africa in 2000. "That's my lesson for taking a vacation: Vacation will kill you."

The Tesla team is successful at achieving seemingly impossible goals not just because they work harder than anyone else. It has a process for solving complex problems that is effective. "I operate on the physics approach to analysis," says Musk. "You boil things down to the first principles or fundamental truths in a particular area and then you reason up from there. Then you apply your reasoning to those axiomatic principles to assess what is really possible and what is simply perceived to be possible." This method leads to innovative solutions that even Tesla executives didn't think were possible.

Says Straubel: "Musk challenges everyone to work incredibly hard. I know that sounds stereotypical, but I think he does it to a degree that is pretty unusual, and it is highly uncomfortable for most people, but the results are fairly undeniable. If you challenge people to work hard, they achieve more than they think they can. Most leaders don't want to do that." Adds Doug Fields, vice president of engineering: "We take leaps of faith that are like jumping out of an airplane and designing and building the parachute on the way down."

That's the necessary approach when you're making the transition from a one-car company to a multi-car company, and doing it at scale, while simultaneously building a giant indoor energy-storage business. That's the Musk Way. ①

Jeff Dyer is a professor at Brigham Young University's Marriott School of Business. Hal Gregersen is executive director of the MIT Leadership Center. Nathan Furr is an assistant professor of entrepreneurship at BYU-Marriott.



THIS WON'T HURT A BIT

Intuitive Surgical's da Vinci robot procedures cost more but can lead to far lower readmission rates, according to a recent study.

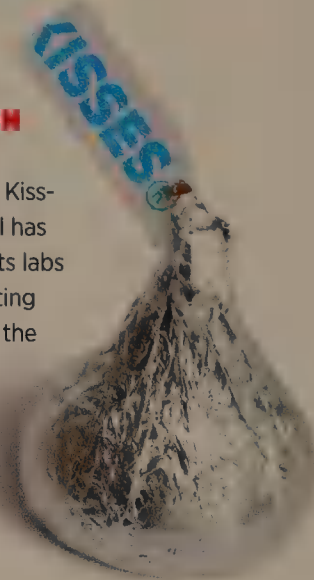


TOWARD A HEALTHIER PORK RIND

Grupo Bimbo came up with a way to make pork rinds, a favorite in the Latin world, without frying them, cutting overall fat by 60%.

ITERATING ON THE KISS

Hershey debuted Kisses in 1907 but still has ideas to pursue. Its labs are now 3-D printing in chocolate, and the brand is moving to simpler, more natural ingredients.



RANK	COMPANY	INNOVATION PREMIUM
/2014 RANK	INDUSTRY / COUNTRY	
81 / 71	COCA-COLA SOFT DRINKS / U.S.	40.53
82 / 76	COLGATE-PALMOLIVE HOUSEHOLD PRODUCTS / U.S.	40.46
83 / *	NXP SEMICONDUCTORS SEMICONDUCTORS / NETHERLANDS	40.41
84 / 52	ESTEE LAUDER PERSONAL PRODUCTS / U.S.	40.35
85 / *	WANT WANT CHINA PACKAGED FOODS / CHINA	40.27
86 / 73	H&M RETAILING / GERMANY	40.19
87 / 37	INTUITIVE SURGICAL HEALTH CARE EQUIPMENT / U.S.	40.16
88 / 96	EXPERIAN CREDIT SERVICES / IRELAND	40.02
89 / 74	ORIENTAL LAND HOTELS & RESORTS / HONG KONG	39.90
90 / 100	TRACTOR SUPPLY RETAILING / U.S.	39.85
91 / 82	GRUPO BIMBO PACKAGED FOOD / MEXICO	39.81
92 / 63	GRIFOLS HEALTH CARE SUPPLIES / SPAIN	39.80
93 / 64	STARWOOD HOTELS HOTELS / U.S.	39.76
94 / 72	SGS CONSULTING SERVICES / SWITZERLAND	39.74
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Solomon Islands Untold Riches

Solomon Islands, a nation comprising 992 islands spanning an area slightly smaller in size than the state of Maryland, lies in the South Pacific more than 1,000 miles east of Papua New Guinea, its nearest neighbor. The nation is perhaps best known in the U.S. as the site of Guadalcanal, where some of World War II's fiercest fighting took place. Home to more than 550,000 people—most of them Melanesian, with smaller communities of Polynesians and Micronesians—the self-governing nation won independence from Great Britain in 1978 but remains part of the Commonwealth.

Under Prime Minister Manasseh Sogavare, who came to power last December for his third term—this time as the head of the Democratic Coalition for Change—Solomon Islands is embarking on a wide-ranging series of reforms that seek to reinforce the nation's institutions and diversify the economy. As a developing nation, it had an economy worth more than \$1 billion in 2014, according to the World Bank,

and has experienced continual economic expansion during the last decade. The challenge now is transforming its potential into reality to reach or surpass the prime minister's goal of 5% annual GDP growth.

"We are a government that means what it says," says Sogavare. "That is the challenge: You have to walk the walk, but also have the resources to push your agenda. This year, we have the biggest budget the country has ever seen. In the past, there was no program of action, no long-term vision. The 'what do we need to do?' question is well known, but not the 'how to do it.' With our new development plan, we can answer this."

At the end of January, after just 50 days in office, the Sogavare government unveiled its ambitious agenda. On the institutional front, it is committed to combating corruption and political graft to ensure good governance from the top down. In public services, the goal is to increase investment in vital human development sectors, such as healthcare and education, which will make a

tangible difference to living standards, while maintaining tight fiscal responsibility.

Regarding the economy, the government intends to revitalize existing industries—such as mining at Gold Ridge, where production came to a halt after flooding in April 2014—and reduce reliance on a finite supply of raw material exports, the most notable of which is timber. Although timber has played a key role in foreign exchange earnings in recent years, overly heavy reliance on it has left Solomon Islands vulnerable to the fluctuation of external demand. The plan is to diversify into and develop value-added sectors, such as agriculture, fisheries, manufacturing and tourism in order to stimulate sustainable, long-term growth.

The administration also aims to develop resources across all nine provinces of Solomon Islands, especially in rural communities where most locals live. It will do this via land reforms that respect traditional rights, but that help people move beyond simply subsisting to generating growth

from the ground up. The underlying goal is to avoid a resurgence of the ethnic tension that caused turmoil in the capital of Honiara from 2000 to 2003, when an Australian-led intervention stabilized the situation.

Building much-needed infrastructure is another key element of Prime Minister Sogavare's strategy. "If you don't have it, you can forget development," he says. Projects on the Tina River are set to double the power supply to Honiara by 2018. Among these is a \$120 million hydroelectric power plant, funded by the government and the Asian Development Bank (ADB). Geothermal and solar initiatives on other islands will further back these projects. The government also has plans for a fiber-optic telecoms cable from Australia to provide worldwide connectivity, and for new roads on Guadalcanal and Malaita to open areas for development.

"Solomon Islands is not historically one country," explains Minister of Finance and Treasury Snyder Rini. "In the colonial era, these islands were grouped together, which poses a real challenge. We have different cultures and languages. We are small but very diverse. However, this is also our advantage. We are stronger together today as one, and the government is working hard to maintain this and balance development around the country. Now is the time to act."

Facts and Figures

Time zone: GMT +11:00

Land area: 11,000 square miles

Population: 572,900 (World Bank 2014)

Ethnic origin: Melanesian (94.5%), Polynesian (3%), Micronesian (1.2%)

Religion: Christianity (Protestant and Catholic, 95%), traditional faiths

Languages: English, Melanesian Pijin and 70-plus indigenous languages

GDP: \$1.046 billion (est. 2014, CIA World Factbook)

GDP per capita: \$1,800

(est. 2014, CIA World Factbook)

GDP growth rate: 3.5%

(est. 2015, World Bank/International Monetary Fund)

Foreign reserves: \$3.98 million

(March 2015, government data)

Exports: \$489 million (2013)—timber, fish, agricultural products (palm oil, copra, cocoa)

Export markets: China, Australia, European Union member states, Thailand

Imports: \$580 million (2013)—fuels, processed foodstuffs, chemicals, manufactured goods

Import markets: Singapore, Australia, China, Malaysia, Japan



Q&A With Prime Minister Manasseh Sogavare

In office since December 2014, Prime Minister Sogavare has held the position twice before, from 2000 to 2001 and from 2006 to 2007. He also has served in Parliament since 1997. In a recent interview, he discussed his government's plans for Solomon Islands.

On Natural Riches

When you talk about this country, you have to talk about natural resources: 85% of these are in rural areas. Our strength lies in our beautiful beaches, reefs and forests. With mining, we have to tread more carefully. Unlike forestry, which is owned by the person who owns the land, mineral resources are owned by the state. For the government to get to them, it has to dig down through six feet of land that belongs to somebody else. People need to understand the benefits of accessing these resources.

On the Islands' People

We need to look at improving our human resources. At the moment, we cannot pride ourselves by saying that this is the main driver of the economy. We need to look at the way we educate our people. The policy now is that when you complete a first degree abroad, you must come back and work before leaving to attain a second or third degree. But we recognize that the world is wide, and therefore the medium-term strategy is to have more Solomon Islanders working abroad and sending remittances home, then eventually returning here to bring back the talents they have acquired abroad.

On Foreign Investment

Right now, we need to make this country attractive for FDI. There is huge potential, but we need to improve our FDI attraction strategy. We want to approach this aggressively. We are looking at Special Economic Zone legislation to zone areas for specific uses, such as tourism. There will be incentives to invest: tax benefits, immigration arrangements and the possibility to send remittances overseas for people working in these zones. There will be a lot of services that make it attractive. I do not see how else we can improve



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"We need to encourage people to manufacture and make something, adding value in Solomon Islands and exporting those products."

the capacity of the government to make realistic investments in health and education. Where does money come from? Taxation. Where does taxation come from? Investors. We need to attract high-quality investors. In the past, we have been attracting those that come with bulldozers, chainsaws and truck drivers. This is not sustainable. We need to encourage people to manufacture and make something, adding value in Solomon Islands and exporting those products.

On Economic Opportunities

One of our main sea resources is tuna. We have been giving licenses to foreign ships that take fish to Thailand, where it is processed then exported back to Solomon Islands. We now have two canning factories and are working very hard on developing this further, but also sustainably with the help of regional assistance. This is very important for our people who see the sea as the best means of survival. The new fisheries management law will provide the framework and guidance to develop these resources sustainably. There are marine-protected areas throughout the country, with guidance on when and how they can be harvested.

INVESTOR WATCH:

Infrastructure and Connectivity

The challenge of building and maintaining infrastructure is greater in Solomon Islands than in most other places on earth, as its South Pacific location leaves the nation vulnerable to natural disasters. In April 2014, Tropical Cyclone Ita wrought havoc, creating flash floods that affected about 10% of locals and washed away roads and bridges on Guadalcanal, just one of 300 inhabited islands in the nation.

"Some 95% of the population of Solomon Islands lives in rural communities," says Minister of Development, Planning and Aid Coordination Danny Philip. "Our priority needs to be developing infrastructure to allow goods and services to reach these people. We are trying to decentralize and promote development outside of Honiara."

Providing reliable power is a challenge for the Solomon Islands Electricity Authority (SIEA). SIEA operates 11 diesel-driven power stations, with an installed capacity of just 36MW. The Tina River



Hydro Development Project, under construction by Korea Water Resources Corporation, aims to add 20MW capacity by 2018, enough to serve Honiara's needs and reduce reliance on imported fuels.

SIEA also has set up a 50kW photovoltaic solar project to explore the potential for renewable sources. But perhaps the most exciting energy prospect is planned for Savo Island, just ten miles from the capital, where Australian company Geodynamics is hoping to harness 30MW of thermal power from a volcano.

Another private player, the Solomons Oceanic Cable Company, plans to introduce

broadband telecoms in three cities by March 2016, the first phase of a \$70 million project. Currently, Solomon Islands depends on satellite connections that can be unreliable, an impediment to developing a digital, service-based economy.

The Sogavare government intends to bring additional private-sector players to put in place the pieces required to attract investment in other industries. As Minister of Commerce, Industry, Labor and Immigration William Bradford Marau says, "Investors won't come if the infrastructure is not there in the first place."

"We have an abundance of natural resources, from forests to fish and beautiful islands."

—WILLIAM BRADFORD MARAU
MINISTER OF COMMERCE, INDUSTRY,
LABOR AND IMMIGRATION



New Economic Zones Incentivize Development

Among the big-ticket items on Sogavare's government agenda for 2015 is the creation of Special Economic Zones in strategic areas of the country that will boost overseas interest in the islands' investment opportunities and bolster regional development goals.

"We have an abundance of natural resources, from forests to fish and beautiful islands," says Minister Marau. "It is important to have the correct policies in place to allow us to get the full benefit from these riches. The government is streamlining the processes behind the Foreign Investment Division to create a one-stop shop for investors."

A new investment incentives bill is also in the works, which will have a number of packages available to respond to the needs of investors in each sector, as well as to comply with the government's strategic goals. "The package you select is your passport to do business in this country without having to wait," the prime minister said in April. The same month, China's Skyline Business Council expressed an interest in investing in the islands' tourism sector, in exchange for upgrades at Honiara International Airport and along the road connecting it to the city.

"Tourism is one of the priority sectors we are trying to promote in this manner," says Minister Rini. "Fishing and forestry are also important areas. The bill will clearly tell the investor what the incentives are, including tax exemptions for businesses and the importation of goods for manufacturing."



Stephen Frink / Getty Images

ECOTOURISM:

One for the Bucket List

Fewer than 25,000 tourists come to Solomon Islands every year. While the islands may be off the beaten track, their scenery—which Lonely Planet deems to be “reminiscent of a Discovery Channel documentary”—as well as their traditions, ecotourism and adventure activities, make them well worth the trip.

Various airlines, including the national flag carrier Solomon Airlines, serve Honiara International Airport, the main point of entry to Solomon Islands. With direct flights to Fiji and Vanuatu, as well as Brisbane and Sydney, the airline provides connections as far afield as London and Los Angeles.

Solomon Islands boasts world-class diving, giving scuba enthusiasts the chance to enjoy marine life in its pristine coral gardens or explore World War II wrecks at Iron Bottom Sound. Other aquatic options include island-hopping by kayak and white-water rafting down one of a number of rivers. And the World Heritage Site of Rennell, the world’s largest uplifted coral island, is just a one-hour flight from Honiara.

On land, options include visiting traditional villages, taking bush walks, checking out turtle-breeding grounds, and watching locals perform centuries-old dances.

“The environmental beauty of Solomon Islands is a huge product for our tourism industry.”

—BARTHOLOMEW PARAPOLO
MINISTER OF TOURISM

“Culturally, we have all the Pacific people in Solomon Islands: Melanesians, Polynesians and Micronesians. That makes us a unique place to visit,” says Minister of Tourism Bartholomew Parapolo.

“Solomon Islands is a diverse destination compared to other Pacific Islands,” says Minister Parapolo. “We have varied cultures, an unspoiled environment, unique flora and fauna, impressive World War II history, and the most warm and friendly people in the region. We also have great diving spots, surfing and a country that is yet to be fully discovered.”

Its status as generally uncharted territory looks set to change, albeit not in the immediate future and not at the risk of compromising its unique culture and landscape. This May, having identified the tourism industry as a driver of long-term growth, the Sogavare government launched its National Tourism Development Strategy 2015–19, a blueprint for projected 9% tourism growth over the next five years.

Prime Minister Sogavare called on locals to participate: “I encourage you to open your land so we can all explore the rich potential we have for tourism. Let us embrace this commitment to develop our nation.” He also emphasized the need for civil society to participate in the holistic growth of the tourism industry. “The donor community, non-state actors, non-governmental organizations and environmental groups should come forward and be partners in this sector,” he said.

The government also hopes that the unification of landowners and interest groups will mean that progress will not come at a cost to the landscape. “The environmental beauty of Solomon Islands is a huge product for our tourism industry,” Minister Parapolo notes. “We are working closely with other ministries and private-sector organizations to protect our environment for sustainable development.” ■

Q&A With Minister of Finance and Treasury Snyder Rini

Snyder Rini has served as Solomon Islands’ Minister of Finance and Treasury under successive governments since 2007, and has been a member of Parliament since 1997. In a recent interview, he spoke about the government’s reform program, its record budget for 2015 and its plans to expand the economy.

Doing Things Differently

When we came into government, we asked ourselves, ‘What did we do wrong since independence?’ We were just carrying on with normal administration, without looking at the bigger picture. Our aim is to grow the economy and broaden the economic base. That’s why our budget this year is the biggest ever, at 4.1 billion Solomon dollars (US\$516 million). There was previously a mismatch between the amounts allocated and what different ministries needed. We are now linking everything together.

Concentrating on Reforms

The budget is focused on the two parallel reforms the government is trying to get done. One is parliamentary reform; the other is sectoral reform. We are trying to reform our constitution, and land reform is key. We also need political integrity. If we don’t do these, the country will not be stable. We are also reforming the social service sector and economic sectors such as forestry, agriculture, tourism and mining.

Impacting Economic Growth

Last year our growth estimate was zero. The flooding we suffered is the primary reason why growth did not happen. The closing of the Gold Ridge mine likewise contributed to poor economic performance. Estimated growth this year is 3.5%, so we are focusing on financing areas we believe have the most potential to make sure it actually happens. We had a budget shortfall, so I acquired reserves the government has had since 2010. In whose interest are we saving this money? We must use it to benefit all Solomon Islanders, and that is why we are using it now.



The Man The Machines

VS.

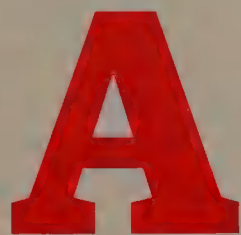
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Brad Katsuyama

a folk hero. His
new platform, IEX,
is poised to make
him millions.

BY STEVEN BERTONI

PHOTOGRAPH BY JAMEL TOPPIN FOR FORBES



Ask Brad Katsuyama if the stock market is rigged and he jumps from his chair, grabs a black marker and sketches on a whiteboard with the intensity of a head coach whipping up a Hail Mary. He draws squares to represent stock exchange servers and scribbles lines to show how high-frequency trading firms are threading cables through miles of rock, building microwave towers atop mountains and raising armies of computer-science Ph.D.s to outrun the rest of the financial community.

"Basically, someone is trading with tomorrow's newspaper," he says from his new offices at 4 World Trade Center, 44 stories above Wall Street. "Not only do they get market data ten times faster, but because their computers are located inside the exchanges, they can trade hundreds of times before anyone else knows what's happening."

Wall Street is in the midst of a billion-dollar drag race. Trading firms are investing huge amounts in advanced algorithms, direct data feeds and ultrafast fiber connections to sprint ahead of the pack via "latency arbitrage." The goal: profiting on stock swings before the other players in the market—the funds, banks, exchanges and retail investors—even know prices have changed.

This game—high-frequency bots account for 50% of stock trading volume—was played in the shadows until author Michael Lewis tackled the subject with *Flash Boys* (Norton, 2014), which cast Katsuyama as the good guy with a fix for a broken system. A simultaneous *60 Minutes* piece echoed the same themes: predatory high-speed traders outrunning powerless or unwilling regulators.

But back then the fix was little more than a theory. Fast-forward 18 months and Katsuyama, 37, is actively doing something about it. His company, the IEX Group, has devised a platform to undercut high-speed trading. Backed by \$101 million from the likes of big-shot money managers Bill Ackman, David Einhorn and the Capital Group, IEX has quickly captured 1.5% of U.S. market volume, with about 95 million shares trading each day.

"Instead of complaining about what was wrong," says Katsuyama, "we decided to show people there was a different way."

That different way still faces entrenched competition. The stock exchanges not only tolerate high-frequency trading—they've also come around to profiting from it. Both the New York Stock Exchange and

Nasdaq collect big fees through what they euphemistically call "colocation," which allows high-frequency trading shops to connect their computers directly to exchange servers to get information before the rest of the public.

"The exchanges now determine who has certain technology and data," says Katsuyama. "That's not the role of an exchange." The exchanges counter that their data and connections are available to anyone who wants it, but as with airlines, there's coach and there's first-class. "Everyone, from trading firms to retail broker-dealers to mutual funds, covets better services to enhance their ability to trade and make money—we provide that service to customers," says Walt Smith, the head of Nasdaq's equity business. (NYSE declined to comment.) Smith argues that fast trading helps investors more than it hurts them. "The data says spreads have never been tighter due to access, liquidity, SEC actions, technology and arbitrage opportunities. Transaction costs have plummeted. Mutual fund trading costs have never been lower. Katsuyama's rhetoric is not supported by the data."

KATSUYAMA'S WAY OF WINNING the speed game is to slow it down. His secret weapon: a metal box with 38 miles of fiber optics coiled inside that stalls incoming trades in a 350-microsecond (a microsecond is a millionth of a second) holding pattern. This delay neutralizes the speed edge needed to game the market the same way speed bumps and humps kill the advantage a Ferrari has over a Ford.

"IEX is a safer and cleaner venue than others," says David L. Brooks, the global head of equity trading at the Boston Co., a \$44 billion asset manager. "He's quickly gained the trust of the buy side." Big banks, often referred to on Wall Street as the sell side, like it, too. "We've done the analysis, and IEX is a lot better" for short-term trading, says Brian Levine, cohead of Goldman Sachs' global equity trading group. "The whole shoe-box phenomenon has eliminated latency arb opportunities."

Plaudits result in profits: From a standing start IEX generated \$27 million in revenue last year. Katsuyama says he's already breaking even. But if he reaches his goal of a 10% market share by 2020, it's a good guess that profit margins could be in the range of 30%. To hit that market share, he needs to move from a private platform to a fully registered exchange. Katsuyama says the paperwork is nearly ready to file, and he's hoping for approval from the Securities & Exchange Commission by year-end. (With IEX's speed bump, it could be tricky—current SEC rules ban interfering with an order when it hits an exchange. So IEX has

“Not only do they get market data ten times faster, but because **their computers are located inside the exchanges, they can trade hundreds of times before anyone else knows what’s happening.”**

hired John Ramsay, the former SEC head of trading and markets, to aid the effort.)

“Katsuyama is offering something substantially better—more efficient trading,” says Steve Wynn, the casino billionaire who invested in IEX after reading *Flash Boys*. “He’ll either get a ton of business from the other guys, or they’re going to copy him. Either way he’s going to make the exchanges change whether they like it or not.”

CHANGING HOW WALL STREET OPERATES was far from Katsuyama’s mind when he launched his finance career. A mild-mannered Japanese-Canadian, he worked up the ranks at the Royal Bank of Canada, moving to its New York office to trade energy and tech stocks. Eventually he was earning seven figures running RBC’s New York trading desk. But in 2007 the markets he thought he knew began to change. It was hard to trade the stock he saw on his screens—bids and

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Hack in the box: 38 miles of fiber optics stalls trades, neutralizing the speed edge.

offers ran away from him the moment he entered an order. It used to be that buying, say, 100,000 shares of Apple at \$100 was straightforward. Now he'd get only part of the order filled at the \$100 that appeared on his screen, before the price jumped to \$100.01.

At first he thought the RBC technology must be slow. But when he asked around Wall Street, he learned the problem was rampant. "If the biggest banks can't buy or sell what they see on their screens, then something is fundamentally wrong with the market," he thought. Determined to solve the problem for RBC, he interviewed dozens of people who had worked in high-frequency trading and hired

Ronan Ryan, a telecom expert who helped firms shave microseconds off their transaction times. The pair began experimenting.

Two decades ago most trades were executed on the New York Stock Exchange or Nasdaq. By the mid-2000s the market had fragmented into over a dozen registered exchanges and 30-plus dark pools—opaque alternative markets often run by banks (IEX is technically a dark pool right now, too). So in 2007 the SEC implemented Reg NMS (National Market System) to protect investors by requiring brokers to get their clients best prices across all registered exchanges. Instead of trading stock in one block, the new regulation whacked orders into small pieces that ricocheted around the exchanges. As regulations so often do, NMS created a new problem. Soon enough computer programs were catching order signals and using their ultrafast connections and secret algorithms to jump ahead to the exchanges to make small but risk-free profits.

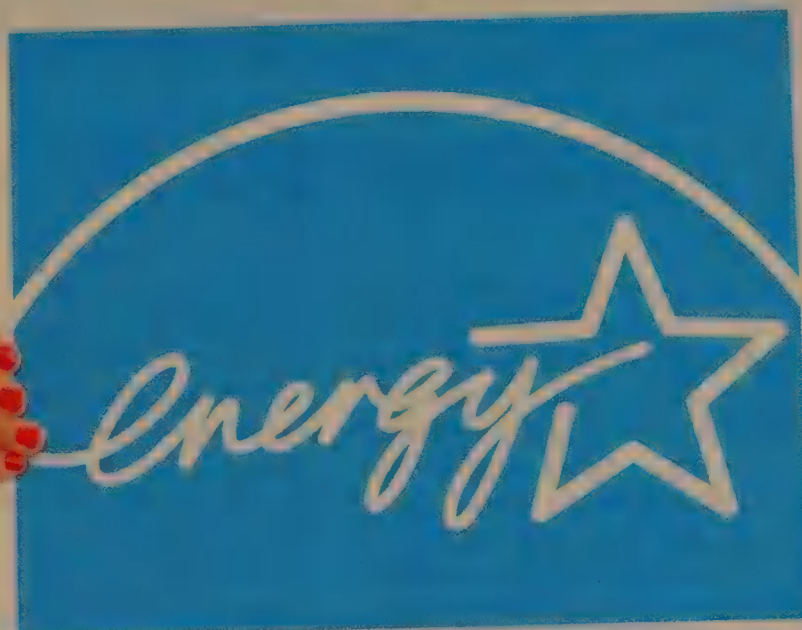
The RBC team (which included IEX cofounders Rob Park and John Schwall) built software, dubbed Thor, that could hide RBC's hand

by making its trades arrive simultaneously at each exchange. That kept the high-frequency traders' software from detecting trades and racing ahead of them. Katsuyama had come up with a fix—but couldn't do much with it. Housed in RBC, Thor was off limits to big banks like Goldman and Bank of America. And since money managers—the buy side—used stock orders as a way to pay banks commissions for services like research and investment banking, the funds wanted to spread their orders across Wall Street rather than send them all to RBC. The only way to scale was to become an independent platform.

Using \$1.5 million in seed money from their friends

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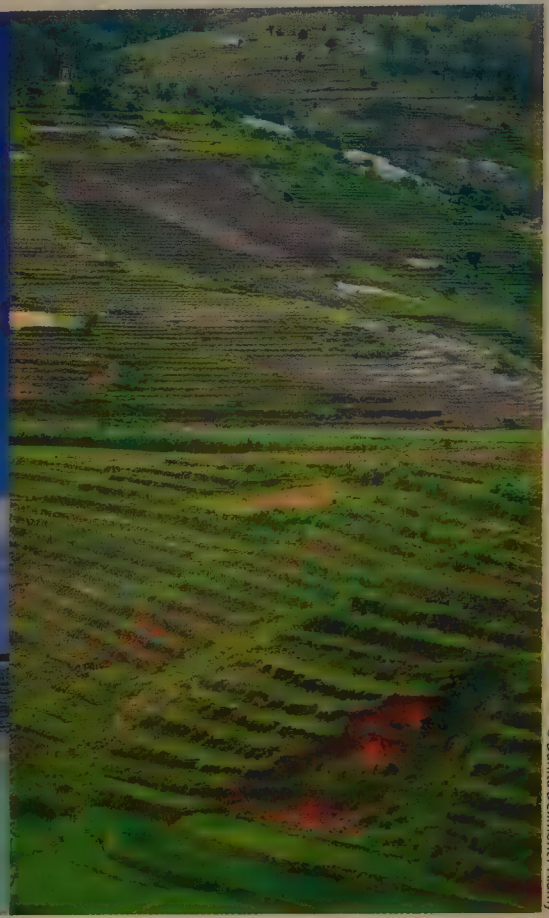
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Madagascar Undiscovered Treasure

The world's fourth-largest island, Madagascar, lies 250 miles off the east coast of Africa in the Indian Ocean. It stretches 1,000 miles from top to tip and spans 350 miles at its widest point. A land of extremes, with peaks reaching 9,500 feet and a coastline 3,000 miles long, it is perhaps best known for the biodiversity of its iconic fauna and flora, including lemurs, fossas, aye-ayes and baobab trees, as well as thousands of other species, of which 97% are endemic.

One of the last land masses settled by people, Madagascar has a unique ecosystem that remains remarkably undeveloped. It recently added 60 new national parks to its existing 200—which now cover 12% of the country—and it has protected 17 million acres of rainforest. The nation currently is working to combat the illegal forestation of rosewood and other rare timbers, and is pioneering community-led Marine Protected Areas. Madagascar is also one of the seven Vanilla Islands in the Indian Ocean that market themselves as authentically eco-friendly travel destinations.

Madagascar won independence in 1960

and transitioned to a multiparty democracy, but a coup in January 2009 left it beleaguered by political and economic instability. Democratic elections held at the end of 2013 saw Hery Rajaonarimampianina win a comfortable majority and take office in January 2014. Under his leadership, the Southern African Development Community, African Union, European Union, International Monetary Fund and World Bank have all re-established relations with the country, and U.S. President Barack Obama reinstated the nation's eligibility under the African Growth and Opportunity Act (AGOA) when Rajaonarimampianina took office.

Perhaps the clearest indication of the return to normalcy in Malagasy-U.S. relations came last August, when President Rajaonarimampianina was among 50 African leaders to attend the U.S.-Africa Leaders Summit in Washington, D.C. The U.S. remains Madagascar's biggest bilateral donor, and the recent Senate renewal of AGOA promises to keep the door open to greater trade and partnership opportunities for U.S. investors.

The Rajaonarimampianina administra-

tion has unveiled an ambitious agenda to improve living standards, rebuild the economy and bring an end to half a century of the "Malagasy paradox." Although the country has tremendous natural resources, more than half of the nation's 23 million citizens live in extreme poverty, and economic uncertainty during the last four years has led to zero growth, leaving Madagascar \$8 billion poorer, according to the World Bank.

The government is now determined to ensure that this resource-rich country fulfills its promise and enjoys a future of peace and prosperity. A basic tenet of its mission is to bring "business as usual" to an end in Madagascar. As a political outsider, the president has pledged to avoid the roller-coaster ride of recent years, which was fueled by cronyism and a lack of accountability. Having overcome a short-lived impeachment vote this June, Rajaonarimampianina is committed to maintaining stability to underpin sustainable development of the economy and Malagasy society.

"The rule of law and good governance are

the pillars of the reconstruction of Madagascar," the president declares. "This will help establish justice and security, and aid in the fight against corruption, which undermines our country. I am committed to implementing good governance, as I believe it to be the mainstay of the battle against poverty, which is the objective of our mission."

Madagascar has lost up to 40% of its budget to graft in recent years, so establishing and enforcing rules that apply equally at every level of society—from politicians to laypeople—is key to cleaning up the country's books and a prerequisite for rebuilding relations with donors and investors. At the same time, the government intends to push through fiscal, financial and trade reforms.

"We are working on the necessary reforms," says Malagasy Prime Minister Jean Ravelonarivo, "including the liberalization of the banking sector: in this case, the central bank and public finances, taxes and customs. The reforms won't please everyone, but we are determined to bring together all our actions and ideas to re-establish the economic and political stability of the nation."

In addition to introducing measures to promote greater accountability of public servants, the government is also mobilizing resources to expand the fiscal base. To date, this has involved imposing more stringent checks on customs and tax declarations, as well as tighter monitoring of statistics and corporate financial reporting, according to François Maurice Gervais Rakotoarimanana,

the minister of public finance and the budget.

"Respect for the law will ensure the economic development of Madagascar," Rakotoarimanana confirms. "We must reinforce our institutions. Economic recovery requires a stable social and political environment that creates a solid foundation for private-sector growth. We have to make it easier for investors by setting up a one-stop shop for all those who want to come to Madagascar to invest their capital."

"The state does not create wealth, but it has to establish an ideal context to achieve this," says Herilanto Raveloharison, the minister of economy and strategic planning, and the architect of the National Development Plan (NDP). "It must uphold transparency, inspire confidence and give guarantees to the private sector and to national and international investors. This is the beginning of a concept of inclusive growth demonstrating that we want to serve the country."

The Rajaonarimampianina government hopes to introduce a virtuous circle, in which a stable and strong public sector creates conditions for private-sector development, which in turn will contribute to state coffers to pay for Madagascar's human development goals. The administration has identified sectors such as mining, agriculture, fisheries and tourism as the most promising—in addition to industries including textiles and new technologies—which could benefit from AGOA and leverage Madagascar's strategic location and

"The reforms won't please everyone, but we are determined to bring together all our actions and ideas to re-establish the economic and political stability of the nation."

—PRIME MINISTER
JEAN
RAVELONARIVO



AFP/Getty Images

cost-effective, well-trained workforce.

"The most important step in improving everyday lives is to create jobs," President Rajaonarimampianina says. "Madagascar has the potential to become the Indian Ocean's breadbasket for agricultural production. Our country has all the assets, and we strive to welcome investors under the best conditions."

"Madagascar is a dream island, full of opportunities," agrees Madagascar Tourism Minister Ulrich Andriantiana. "Tourism offers enormous potential. It can serve as a lever to attain the kind of development we would like to put in place, as it contributes 5% to 7% to GDP. We are lacking in high-end hotel and resort infrastructure, and have agreements with investment-guarantee agencies to offer a secure framework for investment." ■

Q&A With President Hery Rajaonarimampianina

Hery Rajaonarimampianina studied accounting and finance in Madagascar and Canada before returning home to set up one of the country's leading chartered accounting firms. He entered politics in

2009 as minister of public finance and the budget before winning the presidency in late 2013. In a recent interview, he spoke about democracy, unity, society and what makes Madagascar special.



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On Reinforcing Democracy

Any democratic change in Madagascar poses political problems. The most important thing is the commitment of leaders. There is a gap between the vision of politicians and that of the population. We should reduce the distance and strengthen this relationship of trust. This is the foundation of good governance.

On Unifying Visions

We must have a vision in the long term. Investors have a long-term vision, while our politicians were used to a short-term vision. It is this distortion that we need to rectify to have lasting stability. We have implemented a program of global and sectorial policies. There is a dynamic in a positive direction. If everyone agrees and works toward the same goals, the outlook will be better.

On Living Standards

Our mission is to improve the lives of the population. We work with donors to implement social protection initiatives. In the most vulnerable areas, we have already carried out work in education, nutrition and health. We have set up schools and a system of encouragement for mothers to send their children to school. There is already a range of measures in place to support the population in alleviating poverty.

On Madagascar's Potential

We are at the crossroads between Asia, Africa, India and the Arab world; that's what makes our rich culture. Madagascar is a mosaic of cultures, nature and beauty, and all this has shaped a population that is looking forward to the future development of its country. We have a potential that we have not yet exploited enough.

BCMM: Bountiful Resources

Since the French colonial authorities first assayed the island, Madagascar has been famed for its rich, varied metals and mineral resources, which are located in almost every region of the national territory. In addition to having sizable deposits of coal, hydrocarbons and uranium—all in great demand for energy use—it possesses a range of industrial and precious metals, such as cobalt, copper, nickel, titanium, silver, gold and platinum. For now, however, most reserves remain untapped, offering the nation a future bounty, if managed wisely.

The Bureau du Cadastre Minier de Madagascar (BCMM, the Madagascar Mining Claims Office) was created in 2000 to oversee the granting and administration of mining permits, as well as the application of customs duties for the industry. It has recently decentralized away from the capital, Antananarivo, and has set up ten mining-registry offices around the country, bringing its services closer to operators

in the field as a means of countering corruption and a lack of regulation.

"The BCMM's priority is to properly administer permits and promote the professionalization of the sector," says Jaobarison Randrianarivony, the special advisor to the president of BCMM. "Madagascar is a country devoted to mining. There is real potential here. If you look at the mining sector, at large mines specifically, there are only two or three large companies. In theory, we should have ten or 15 big mines."

The BCMM is also responsible for the distribution of revenue from mining activities to local communities, returning a share of the wealth that lies beneath the land to those who live above it as part of the government's drive to improve the quality of life of Madagascar's people. "Everyone participates," Randrianarivony notes. "Everyone is involved in development, and the redistributed funds contribute to the socioeconomic development of the regions."

ARO: Capitalizing on Potential

Assurances ARO is Madagascar's first and largest insurance company, with four decades of experience, 22 agencies nationwide and a 57% market share. The only domestic insurer to hold ISO 9001-2008 quality certification and an AA credit rating from Global Credit Ratings, ARO provides coverage for all kinds of clients, from pensions, home insurance and vehicle policies for private individuals to underwriting risks for the largest multinationals in the country, such as mining giants QQM Rio Tinto and Dynatec.

The insurance sector in Madagascar has huge potential for development, something ARO has capitalized on in the last five years: "We have grown annual revenues from \$16.6 million to \$31.5 million," says ARO's managing director, Patrick Andriambahiny, "and have witnessed a 206% rise in net profits over the same period."



Patrick Andriambahiny
Managing Director, ARO

Subterranean Treasures

Explore Madagascar's untapped potential

The Bureau du Cadastre Minier de Madagascar, or BCMM as it is more commonly known, is the agency that manages all mining licenses in Madagascar. In addition to its transparent management, BCMM makes a substantial contribution to the country's economic development by collecting administration fees. It currently plays a very important role in promoting the Malagasy mining industry by making licensing information available to the public. Licenses are granted 35 working days after application, quickly giving access to Madagascar's hidden treasures.

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and their own savings, Katsuyama and Ryan bolted RBC in March 2012, huddling in a closet of an office in One Liberty Plaza to create a solution that wouldn't infringe on RBC's ownership of Thor. Since distance was the biggest killer of speed, they developed the magic shoe box as a way of creating remoteness while staying in the financial epicenter of Manhattan.

"It's opposite what exchanges were doing," says Katsuyama. "Instead of bringing people as close as you can to your [stock order] matching engine, we were pushing everyone as far away as we could." In March 2013, with their solution in hand, they raised \$24.4 million from asset managers as frustrated with the markets as Katsuyama had been at RBC, including Belfer Management, Capital Group and hedgies like Ackman and Einhorn.

A year later they hit marketing gold with Michael Lewis' *Flash Boys* and the *60 Minutes* episode. Katsuyama watched the show in his New York apartment with his wife. As the segment ended, his phone exploded. "Guys were screaming, calling me a traitor, promising I'd never work on The Street again," he recalls. It wasn't all haters. Five hundred résumés hit his e-mail that night. Then guys like Wynn and Spark Capital's Alex Finkelstein called to invest. By the fall Katsuyama had \$100 million in ammo to take on the predators.

IT WILL REMAIN A TOUGH fight. Katsuyama's whole pitch is that the current system is unfair—yet if he's to succeed on a large scale, he must win over people who currently run the system. "He's got this delicate p.r. problem, because he risks insulting his customers," says Michael Lewis. "After setting off this stink bomb in the industry, he has to clean up some of the smell." The cleanup involves bringing the sell side—the Goldmans, BofAs and Citis—into his camp. "If you want to build a scalable solution and really make a change in the market, you can't leave out the brokers," says Ronan Ryan. "You need to bring together the buy side, the brokers and the exchange."

IEX markets itself as a transparent, fair exchange. The revenue model is simple—nine-hundredths of a penny for every share traded. IEX bans colocation and

"After setting off this stink bomb in the industry, he has to clean up some of the smell," says *Flash Boys* author Lewis.

special connections. "We're not going to charge you for every port and cable and data feed," says Ryan. "We will charge you for buying and selling stock. The brokers respect that."

And then there are the high-frequency clients. The debate following *Flash Boys* was whether high-speed trading was good or bad. Of course it's more complicated than that. Many such firms act as marketmakers, adding valuable liquidity to the system, in many ways making it better for investors than ever. Virtu—a high-frequency firm whose IPO was delayed a year because of the *Flash*

Boys furor—is one of IEX's biggest clients. Running an exchange is expensive, and IEX can't compete with the big U.S. exchanges without attracting more high-frequency trading volume. From IEX's perspective, the trick is to deter the abusive bots while attracting the beneficial ones. "Some love us because we keep away the predatory guys. Other firms hate us," says Katsuyama. "If you're just making markets, you shouldn't care about what we've built."

Ultimately, the success of IEX hangs on winning that coveted exchange status. Then brokers wouldn't be able to bypass it. (Reg NMS requires that traders would then have to use it if it has shares priced better or equal to the other exchanges.) This alone will greatly increase volume. Second, as an exchange, IEX could list company stock. That opens up the potential for high-margin listing fees (the NYSE gets about 10% of its revenue this way) and for capturing the heavy volume that trades when the market opens and closes. Steve Wynn says he'll move Wynn Resorts shares over and plans on spreading the word to other casino owners like Las Vegas Sands' Sheldon Adelson. Katsuyama even thinks IEX's mission to use technology to promote openness will help woo Silicon Valley companies like Apple, Google and Facebook. A move from any of those companies could spark a major migration to IEX.

In that effort Katsuyama could get a big boost from Hollywood. Screenwriter Aaron Sorkin is in talks to write a *Flash Boys* script for the big screen. "Guys tell me Jackie Chan should play me," says Katsuyama. "Dude, Jackie Chan's like 60 years old and knows karate." He's also made a ton of money. **F**

BLACK AR

Elisa Stephens and her family built an \$800 million fortune converting student loans into questionably valuable art degrees and pouring the profits into San Francisco real estate. Now, after two decades of blistering growth, her empire of false hopes is finally facing regulatory glare.

BY KATIA SAVCHUK

PHOTOGRAPH BY TIM FLANNERY FOR FORTUNE



TS

It's almost midnight, and Elisa Stephens wants another tequila and lime. "Shake the sh-- out of it," she tells the bartender. Stephens, 56, is wearing a fitted black skirt-suit with a Chanel clutch and a sparkling brooch the size of a Christmas ornament. She's several drinks past her so-called "final final," but who's counting? After almost eight hours hobnobbing with style aficionados and well-heeled San Franciscans at her Academy of Art University's spring fashion show, her mahogany hair is still perfectly coiffed, fuchsia lipstick unmarred. Earlier, students paraded their designs down the runways at the former Concordia-Argonaut Club (started in 1864 by Levi Strauss), which the Stephens family bought in December. Elisa made sure photographers snapped her with fashion designer Lubov Azria, San Francisco Mayor Ed Lee and former mayor Willie Brown. After the show, guests feasted on filet mignon topped with foie gras and drained the house dry of red wine.

Stephens has plenty to celebrate. Since taking over as president of the family-owned Academy of Art University more than two decades ago, she's transformed the 86-year-old for-profit institution from a regional operation into America's largest private art university. Under her watch enrollment has skyrocketed from 2,200 to 16,000, generating an estimated \$300 million in annual revenues, heavily subsidized by federal student loans. The Stephens family has turned that pile of art-school tuition into one of the largest real estate empires in San Francisco, with more than 40 properties in prime areas, including a historic former cannery on Fisherman's Wharf and a 138,000-square-foot office building steps from City Hall. In all, the real estate is worth an estimated \$420 million, net of debt, and the family pulls in tens of millions of dollars each year leasing these buildings back to the Academy of Art for classrooms and dorms.

Thanks to the university's financial success, Stephens, her younger brother, Scott, and her parents, Richard and Susanne, are worth an estimated \$800 million. A fixture in San Francisco's society pages, Elisa, her husband, Ed Conlon, a vice president at a California construction firm, and their 10-year-old son live in a five-story \$6.1 million home nicknamed the "Jewel Box" in ritzy Nob Hill. Recently she paid \$3.3 million in cash to expand her estate in a gated Phoenix golf community. The family also owns a \$13.4 mil-

lion mansion in a posh San Francisco suburb, getaways in Pebble Beach and Lake Tahoe, a corporate jet and a yacht named *Elisa*. Plus a collection of 250 classic cars worth around \$70 million, which Elisa often drives in city parades, to the opera or when heading to lunch.

But behind the shiny façade is a less than lustrous business: luring starry-eyed art students into taking on massive amounts of debt based on the “revolutionary principle” (Stephens’ phrase) that anyone can make a career as a professional artist. No observable talent is required to gain admission to AAU. The school will accept anyone who has a high school diploma and is willing to pay the \$22,000 annual tuition (excluding room and board), no art portfolio required. It would be easy to accuse AAU of being a diploma mill, except the school doesn’t manufacture many diplomas. Just 32% of full-time students graduate in six years, versus 59% for colleges nationally, and that rate drops to 6% for online-only students and 3% for part-time students. (Selective art schools like the Rhode Island School of Design and Parsons graduate 90% of their students.) The few AAU students who manage to collect a degree are often left to their own devices in finding employment in a related field. In marketing itself to dreamy prospects, the school touts its success at placing students at Pixar, Apple and Electronic Arts. But the morning shift at the local Starbucks is just as likely for some students. That and a mountain of debt. In the 2013–14 academic year 55% of the school’s roughly 10,700 undergraduates had federal student loans totaling \$45 million.

Slowly, the illusion is starting to unravel. Enrollment is down 2,000 from its peak in 2011. Estimated profit margins have shrunk from double digits a decade ago to likely single digits; Stephens says the university is profitable but won’t name a figure. The school faces serious code violations on three-quarters of its buildings. Its abysmal graduation rates have recently drawn scrutiny from its accreditor. Many of AAU’s programs risk losing federal aid eligibility, after tough new regulations governing for-profit colleges went into effect in July. And the school is fighting a whistle-blower suit by former recruiters who say they were paid more, illegally, if they enrolled more students.

The Academy of Art University may still be a long way from its “final final,” but Stephens is clearly having to work harder than ever to keep the party going.

ELISA’S GRANDFATHER RICHARD S. STEPHENS, A painter and art director for *Sunset* magazine, the glossy 117-year-old West Coast lifestyle publication, founded the art school with his wife, Clara, during the Great Depression. From a two-room loft in downtown San Francis-

co, their Academie of Advertising Art trained 45 students a year for jobs at ad agencies. After World War II enrollment grew to 250 and the school added classes in fashion illustration, fine arts and cartooning.

In 1951 the founders’ son, Richard A. Stephens, took over. A Stanford grad, he was gregarious and plainspoken, with a penchant for flashy cars. Over the next few decades, Stephens expanded the curriculum to include photography and fashion. Realizing that rising rents could put the school out of business, he bought its first five buildings.

“The Princess,” as Elisa’s father calls her, started tagging along to work with him while growing up in Hillsborough, a wealthy suburb south of San Francisco. After graduating with a political science degree from Vassar in 1981, she took classes at the family’s university for a year, then got a law degree from the University of San Francisco (on the strength of her J.D. she now asks to be called “Doctor”). Stephens worked as a lawyer for cellphone network operator General Cellular before joining AAU as in-house counsel in 1988.

By then her father had become chairman and handed off daily operations to outsiders. When she decided to take the helm, he spent two years training her. That included a lot of business breakfasts, lunches and dinners. “He taught me to do

as much as you can face-to-face,” she says. “See and be seen.”

Elisa became president in 1992; the school then had 2,200 students and \$8 million in revenues. From the beginning her philosophy was “bigger is better.” To give the school a competitive edge, one of her first moves was to spend \$1 million—some 12% of revenues—outfitting classrooms with the latest Macintoshes. In 2002 she launched online programs, which along with increased marketing and expansions in federal aid dramatically boosted enrollment. Stephens also went on a real estate shopping spree, buying 11 buildings in the 1990s and another 17 the following decade. The family leases all of them to the school.

By 2007 enrollment reached 10,000, a figure the family once thought impossible. “It made us pause and think, ‘Wow, maybe there’s no limit to this,’ ” Stephens says.

Stephens’ office is on the sixth floor of a building named after her father in San Francisco’s techno-hip South of Market neighborhood, a six-minute walk from the loft where the school was founded. As the spring semester wound down, she was plotting how to get enrollment beyond its peak of 18,000 in 2011. “The larger you are, there can be a tendency to slow down. The challenge is staying agile, moving quickly and keeping things simple,” she says. Much of the future expansion will happen virtually, she says. All but 6 of the school’s 76 degree programs are online, and 35% of students are online-only.

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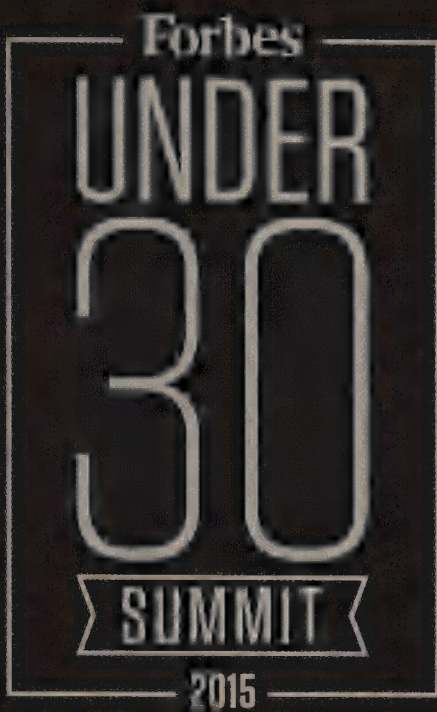
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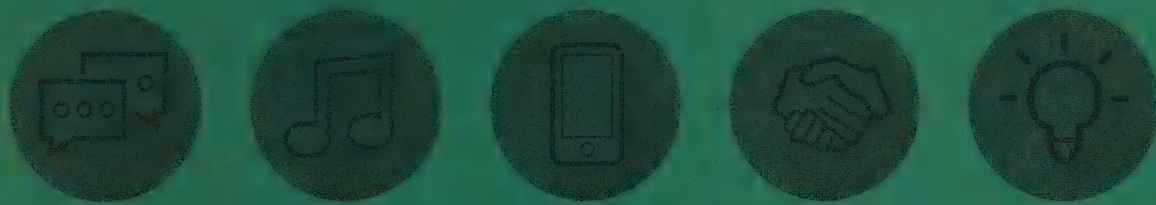
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She also wants to recruit more foreign students, now one-third of enrollment, presumably because they pay tuition out of pocket, no regulatory strings attached.

Today the school, which is owned by the Stephens Institute, a California corporation controlled by family trusts, is worth an estimated \$300 million, much less than a decade ago, according to analysts and to trends among publicly traded competitors. When for-profit colleges were in their heyday in the 2000s, the school likely had profit margins north of 15%, though such margins have since fallen to high single digits across the sector.

"This industry was the darling of Wall Street," says Trace Urdan, a research analyst for Credit Suisse. "But you have a federal government that for the last six and a half years has been very hostile to this sector. The re-regulation of this space has depressed valuations."

The Obama Administration removed loopholes that let

for-profit colleges base recruiters' salaries on enrollment figures, and it required states to approve online programs. In July revised "gainful employment" regulations, meant to improve the quality of degrees, went into effect. Now for programs to stay eligible for government aid graduates of for-profit schools can spend no more than 20% of discretionary income or 8% of total annual income paying federal loans. The rules are an "existential threat" to for-profit colleges, particularly art schools, says Urdan.

At AAU up to 13 programs—out of 16 for which data were available—wouldn't meet the new standards, based on preliminary rates the Department of Education calculated in 2012. An AAU spokesperson points out that official rates, which will come out in 2016, could differ from the earlier figures. "Many of our students do not use financial aid, so it would not affect those students. Students affected can transfer to another program or use al-

THE ACADEMY OF REAL ESTATE

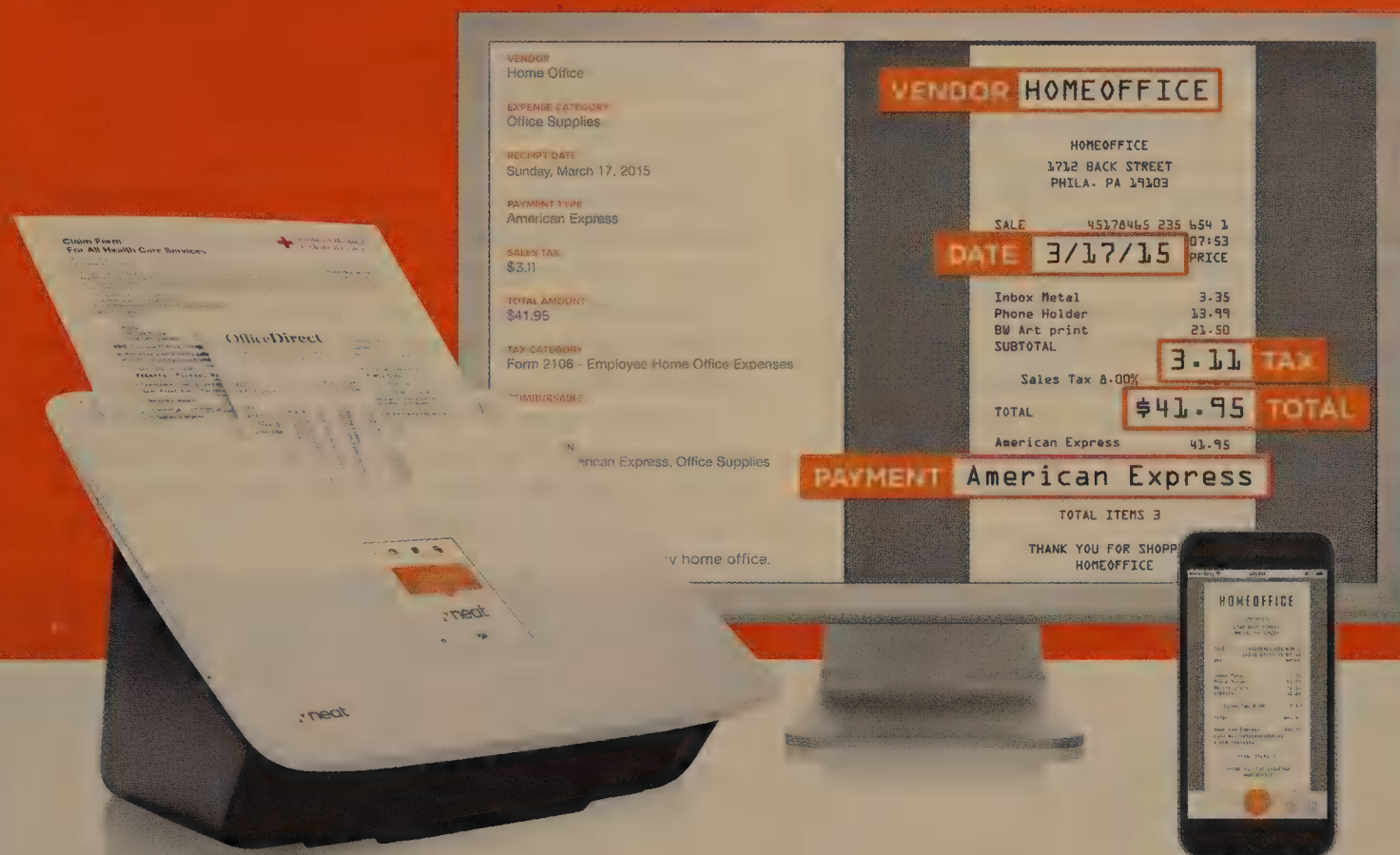
The Stephens family has gobbled up 40-plus buildings for their school in San Francisco hot spots through LLCs and a family-held corporation. Thirty-one are under fire for planning-code violations.





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ternative funding,” the spokesperson says. Time will tell if other funding is really available—or if AAU can make up the difference with foreign students and affluent recruits.

The feds aren’t the only ones taking a hard look at AAU. A review team from the school’s accreditor, the Western Association of Schools and Colleges, concluded last year that AAU’s low graduation rates “may indicate that students are not aware of or are not realistic about what it will take to be successful. ... This is an expensive proposition when these same students are unsuccessful.” Despite its anemic graduation rates, AAU keeps an entire semester’s tuition if a student is enrolled for at least four weeks, as is typical for art schools. Although WASC reaffirmed AAU’s accreditation for another seven years in July 2014, it issued a “formal notice of concern,” largely because of the low graduation rate, and scheduled a special visit for 2016 to review the school’s progress.

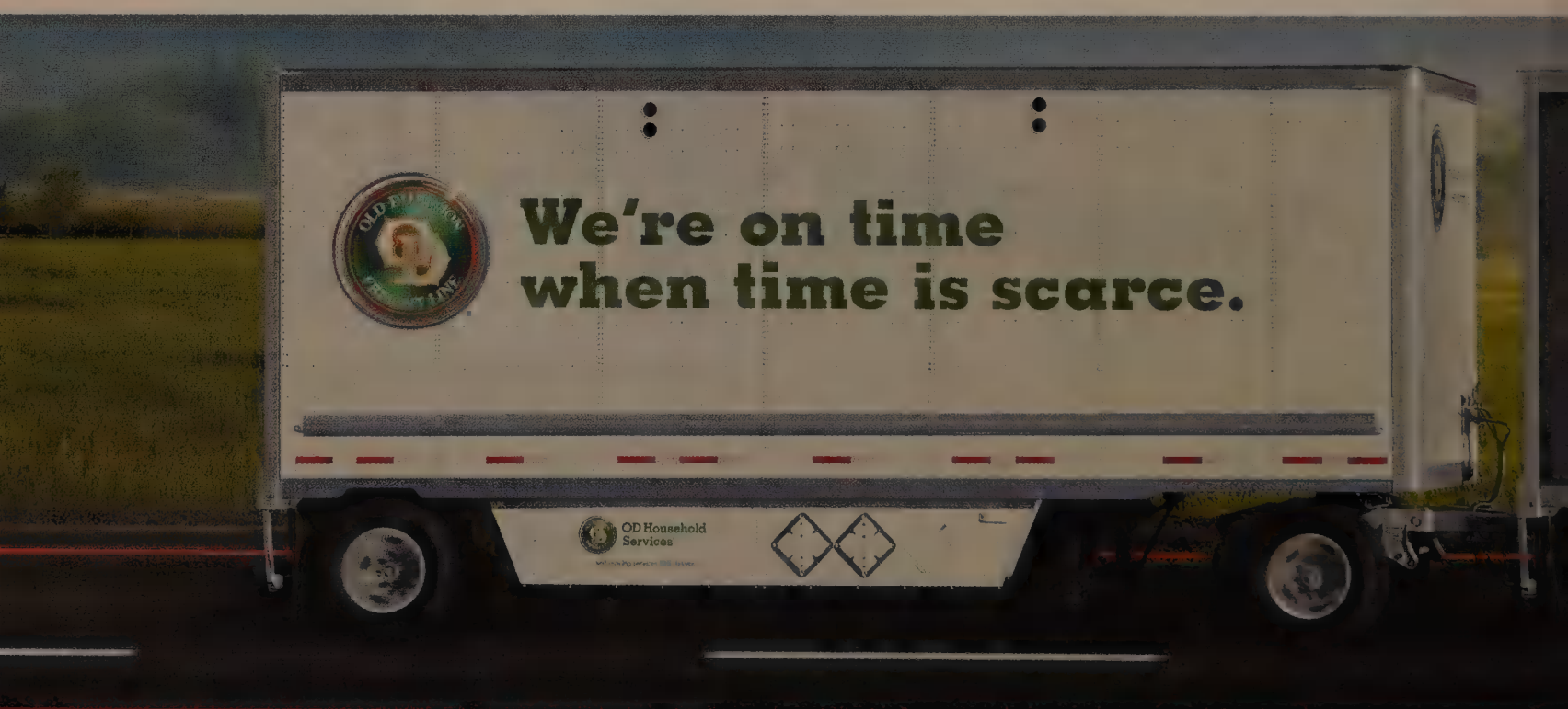
Stephens insists that graduation rates are a “red herring” at a place like AAU. “If a student can get that portfolio built before they finish all their requirements, and they get a job in their field of study, then we don’t want to keep them here,” she says. “The diploma won’t make one bit of difference.”

But exactly how many of AAU’s grads actually land a job in their field of study is a bit of a state secret.

ONE OF THE BIGGEST BLOWS TO THE FOR-PROFIT education sector came in April, when Corinthian Colleges, based in Santa Ana, Calif., shut down and filed for bankruptcy. At its peak it had 81,000 students across 111 campuses. It closed after the Department of Education fined it \$30 million and cut off student aid because it had misrepresented job-placement rates at subsidiary Heald College.

Like AAU, Heald was accredited by WASC, which doesn’t require colleges to disclose job-placement figures. But under federal regulations Heald had to release the rates because it had voluntarily collected them. AAU also tracks job-placement statistics, Stephens says, but it doesn’t publish them despite the federal requirement to do so. A spokesperson for the Department of Education says schools that don’t comply with the rule may be cut off from federal student aid if violations are deemed “egregious.” In response, AAU says, “We are not required, or able, to disclose placement rates until DOE finalizes its formula” for calculating them. The Department spokesperson says all schools that voluntarily collect job-placement rates must share them and the method used.

The most recent job-placement rates AAU published were from 2006, before it switched to an accreditor that doesn’t require disclosure. It claimed about 80% of grad-



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uates got jobs in their field of study. Stephens won't disclose current figures.

Certainly at least some students go on to get jobs at established companies. On its website the school says some 2013 graduates of the Web-design program were hired by Facebook, Google and Hewlett-Packard; illustration grads got jobs at Electronic Arts, Paramount Pictures and

"IT'S AN OPERATION OF LAWLESSNESS NEVER SEEN IN AN OTHERWISE REASONABLY OPERATING CITY."

Sony; animation and visual-effects grads landed at Disney, DreamWorks and Pixar. The school won't say how many students have been hired at these firms.

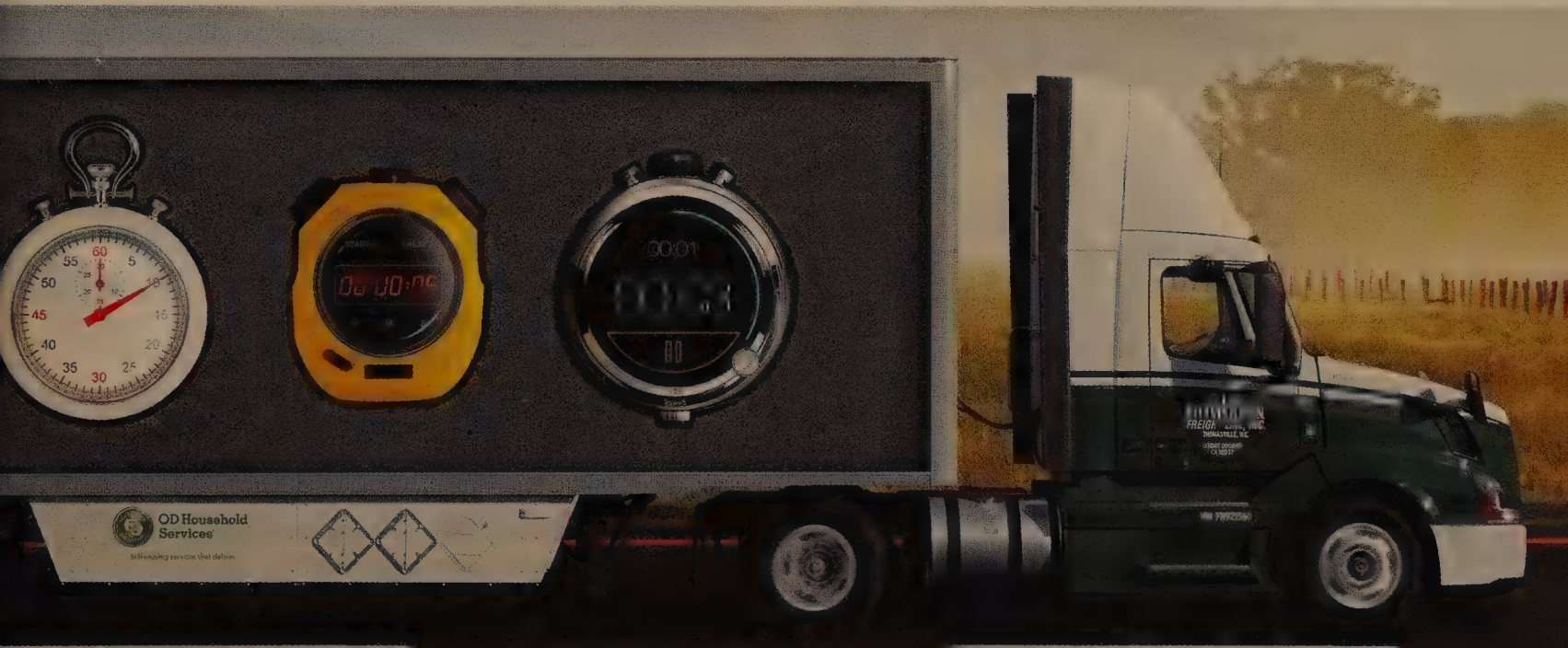
Vince De Quattro, who directed AAU's online animation and visual-effects program from 2004 to 2011, says the school misrepresented job-placement rates. In his complaint in a 2012 wrongful-termination suit filed in San Francisco Superior Court, De Quattro said the 75% job-placement figure that AAU advertised during his ten-

ure didn't include online students, who had more trouble finding jobs. De Quattro claimed he was fired after bringing up concerns at a meeting in March 2011. (The suit was dismissed because he couldn't prove he'd mentioned the statistics at that meeting.) AAU declined to comment.

De Quattro, who now heads production at a Bay Area animation studio, says that while AAU has success stories, its business model is based on underperformers. "There are many students left behind," he says. "From an initial class of, say, 100 students, we get maybe 5 kids at the end that are employable."

Some students really struggle. After graduating from AAU in 2012 with a bachelor's degree in animation and visual effects, Jacob Fraga spent two years working at Starbucks. He was drawn to AAU because it touted connections to companies like Pixar, but he says he didn't get meaningful guidance for finding a job. "It just didn't feel like anybody really cared where you ended up," he says. Fraga, who owes \$25,000 in student loans, is now driving for Lyft and taking computer science classes at a community college in hopes of getting a better job. "I've felt pretty helpless. How am I going to get out of this debt?" he asks.

Tamara Huynh also ended up making coffee at Starbucks, five minutes from Stephens' office, after earn-



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ing a bachelor of fine arts degree in 3-D modeling and sculpting from AAU in 2011. While the school promises in its catalogue that faculty are “top-notch professionals who earn a living doing what they teach,” Huynh said that some instructors were recent college graduates or people who hadn’t worked in the industry for years. (AAU says faculty usually have at least two years of industry experience.) Huynh applied for about 60 jobs in her field after graduation but had no luck. Meanwhile, she and her parents, who are art teachers, are on the hook for \$68,000 in loans. “I know art is hard, but I was expecting to be more prepared for what was out there,” she said. “I thought if you managed to graduate, all the doors would open up for you. That’s not necessarily the case.”

That’s not part of the script for staff at AAU’s telemarketing centers, which are tasked with finding new students. Mallory Lynch, a former admissions representative who resigned in February, says managers told her to woo students with success stories and avoid mentioning the dropout rate. She felt uncomfortable selling the school to people who were clearly unprepared (including an unemployed mother of four, those who couldn’t afford the \$100 application fee or prospective online candidates who had no computers).

“We tell them anything is possible and that we’re going to give them the skills they need to succeed,” Lynch says. “It felt problematic to pressure them and tell them they can afford it when we knew they were going to drop out within a few weeks after school starts.”

In 2009 four former AAU admissions staffers filed a whistle-blower suit in federal district court in Oakland, claiming the school had illegally adjusted recruiters’ pay based on the number of students they enrolled. AAU, which declined to comment on the lawsuit, said in court filings that the compensation scheme was then legal under a “safe harbor” loophole because it also considered qualitative factors. The recruiters’ attorney, Stephen Jaffe, says the parties are in talks to settle.

AAU HAS ALSO RUN INTO TROUBLE ON THE GROUND. The Stephens family—who owns nearly all of the university’s buildings—has outstanding planning-code violations on 31 of their 40-plus properties, some dating back to 2005. The violations chiefly involve unlawfully converting offices into classrooms or transforming hotels and apartments—including rent-controlled housing—into dorms. AAU illegally operated for years without an Institutional Master Plan, and it has spent seven years drafting an environmental impact report that typically takes three years. AAU blames the delay on the city’s timetable.

ART WORKS

DESPITE THE STRUGGLES facing some graduates of San Francisco’s Academy of Art University, enrolling in art school can be a pretty good career move. Art school grads aren’t the highest earners overall, but neither are they doomed to become starving artists.

“There’s a ton of evidence that prospects for graduates from art schools today are better than they’ve ever been before in terms of income, their ability to survive economic turbulence and their preparedness for the job market of the 2020s,” says Columbia University professor Jennifer Lena, who is senior research scholar for the Strategic National Arts Alumni Project.

Visual and performing art students who graduated in 2014 had an average starting salary of \$36,222, according to the National Association of Colleges and Employers. That’s higher than majors in biology and education.

By midcareer, industrial design, fashion design and architecture majors earn a median salary above \$77,000—more than those who studied accounting, human resources or business

administration—according to PayScale, which aggregates self-reported salary data from millions of workers. Creative directors, user-experience designers and design managers fetch a median salary of more than \$90,000. These days those jobs require a lot of technical know-how. “Technology has had a very positive effect on the earnings of people in art fields,” says professor Anthony Carnevale, director of the Georgetown University Center on Education and the Workforce.

There are plenty of jobs out there. Jobs for curators, architects, interior designers and multimedia artists are projected to grow at a rate faster than the overall labor force through 2018, according to the National Endowment for the Arts. But prospective students need to do their research and focus on the best schools for their field of interest. The Rhode Island School of Design boasts a job-placement rate of 98%, with many working in user-experience design and interactive graphics. Brigham Young University’s small animation program has strong ties to Hollywood and videogame firms, with 85% of recent grads landing jobs at top animation studios and game companies.

—K.S.

“It’s an operation of lawlessness never seen in an otherwise reasonably operating city,” says San Francisco Planning Commissioner Kathrin Moore.

Still, AAU has faced fines of just \$420,000 for violations on a single property, which it hasn’t paid, according to a planning department spokesperson. It has paid some \$50,000 in fees for permit violations on multiple buildings. Aaron Peskin, a former city supervisor running for reelection this year, accused Mayor Ed Lee of running interference on behalf of AAU. Stephens is frequently photographed with Lee. She and the planning department spokesperson deny that Lee has stepped in; Lee’s office didn’t respond to requests for comment.

Stephens sounds baffled by the groundswell of negative attention: “I don’t know what prompted somebody to wake up and see us finally,” she says. “We’ve been here, and we haven’t been hiding out.”

That much is certainly true. Even the most preoccupied visitor to San Francisco can’t help but notice the multitude of bright red Academy of Art banners fluttering from some of the city’s most desirable addresses, all selling the promise of turning anyone with a fat wallet—or a federal loan—into a working artist ... or failing that, helping to pay for Elisa Stephens’ latest classic automobile. 

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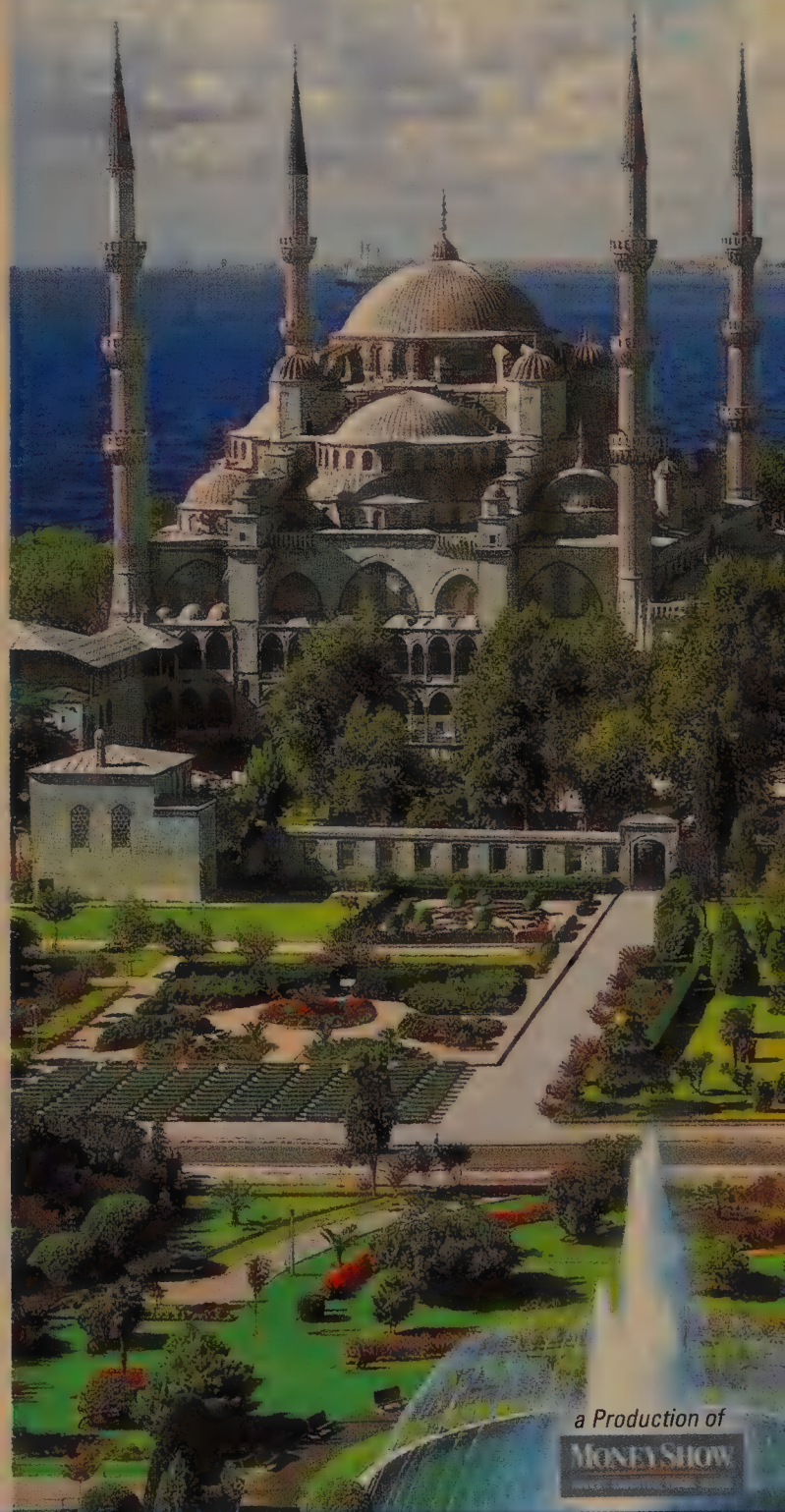
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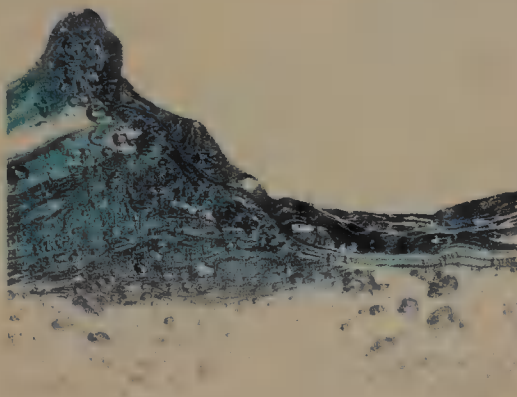
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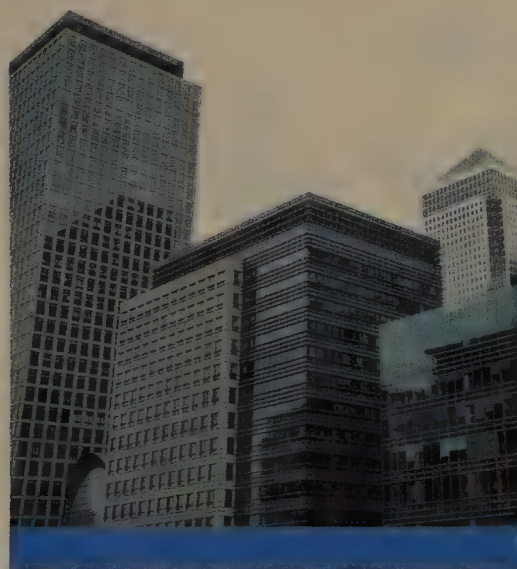
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Mauritius

An Economic Miracle

Mauritius is one of Africa's wealthiest, most competitive economies, despite lacking the continent's traditionally prized natural resources. A remote island nation with 1.3 million people, Mauritius had to adopt a creative strategy to carve out its niche in the post-colonial world. Half a century ago, it had an economy rooted in a single crop—sugarcane—which, in 1970, provided an average annual income of less than \$400. In the last three decades, it has diversified into high-growth industries such as offshore finance, textiles and tourism, and now has a GDP per capita of \$9,300 and an economy worth \$12.6 billion.

Independent since 1968, Mauritius retained Queen Elizabeth II as head of state until it became a republic in 1992. That date coincided with the rise to power of one of its longest-serving politicians, Anerood Jugnauth, who started his career in the 1970s as the leader of the opposition party. He went on to serve as prime minister twice, in 1982–85 and 2000–03, as well as president, from 2003–12. He resumed the position of prime minister last December following a landslide victory in the 2014 general elections.

Prime Minister Jugnauth is widely credited as the architect of Mauritius' "economic miracle," a set of policies including

the revitalization of the duty-free trade zone and the export textiles industry in the 1980s and early 1990s, which enabled the nation to develop a more defined economic presence. This April, in his administration's 2015–16 budget meeting, he laid out his vision for a more sustainable future for Mauritius. It was founded largely on inclusive development, higher volumes and quality of investment, job creation, greater social justice and a more-accountable government, all of which aim to bring about a second economic miracle.

The government's primary goals are to elevate annual GDP growth to more than 5%, an average rate Mauritius has maintained for most of the last 30 years; raise GDP per capita to \$12,000; and become a high-income country—all by 2020. The administration plans to achieve these goals via innovative initiatives that are set to revitalize the economy. These include building a nationwide network of smart cities; transforming the capital of Port Louis into a regional hub; establishing a bank specifically to support small- and medium-size enterprises (SMEs); restructuring investment plans for tourism resorts and real estate; and cutting red tape. Institutions such as the Board of Investment would help to improve the business climate and facilitate foreign direct investment (FDI) inflows.

"We want to be seen as a very transparent jurisdiction," says Sudarshan "Roshi" Bhadain, who leads the newly created Ministry of Financial Services, Good Governance and Institutional Reforms, and also has served as minister of technology, communication and innovation since early July. "It's very important to show we have the right platform and can leverage that to explain to the world how we are operating and how we want to do business in a clean, compliant manner," he says.

Open to International Investment

Ranked 28th worldwide and number one in Africa in the World Bank's Doing Business 2015 list, Mauritius is already a welcoming jurisdiction for overseas investors and companies. It has above-average scores for tax payment and cross-border commerce. The country has an open policy that welcomes non-Mauritians to work in the country, and setting up a company is a straightforward process that takes just three business days. Mauritius is also Africa's leading performer on the Heritage Foundation's Index of Economic Freedom and Forbes' 2014 Survey of Best Countries for Business.

Leveraging its strategic location for trade with Africa, Asia and Australia, the nation is transforming itself into an international jurisdiction for investors in search of security, transparent regulation and high-value addition. Mauritius has been a member of the Southern African Development Community (SADC) since 1995, providing privileged access to the SADC Free Trade Area.

Transitioning Into a Blue Economy

The foundation of Mauritius' future development will rest on an all-new series of pillars, in which the "blue," or ocean-related, economy and information and communications technology (ICT) will

play a large role. Through this approach, the nation will work to protect and sustain the ocean's bounty; enhance aviation and maritime links via planned infrastructure investments; create a knowledge hub by upgrading and specializing the nation's educational framework to better serve the needs of the marketplace; and transform Mauritius into a "nation of entrepreneurs," driven by SMEs and local ideas.

For more than a decade, the homegrown ICT and business process outsourcing (BPO) sectors have relied on the country's well-trained, multilingual and cost-effective workforce to provide outsourced services to major global companies. Now, the industry is poised to benefit from the government's efforts to embed connectivity throughout the economy, leading to cloud-based innovations for businesses and end users and offering the potential to create thousands of jobs.

"The financial sector is definitely going to take Mauritius forward," Minister Bhadain says. "Now we need to look at the bigger picture, and we have to take our stock exchange to a different level. Mauritius

"The role of Mauritius' financial sector is much deeper now in global business than ever."

—JAMES BENOIT
AFRASIA BANK



has to become the platform, the gateway for Africa. We want to be for Africa what Singapore is for Asia, what Luxembourg is for Europe."

James Benoit, the CEO of AfrAsia Bank, which serves private, corporate and investment banking clients who do business in the trade corridor between the two continents, agrees. "The role of Mauritius' financial sector is much deeper now in global business than ever. I would say that about 35% of our balance is to Africa. Mauritius is becoming a supplier to Africa." ■

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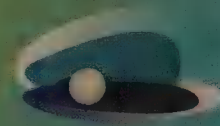


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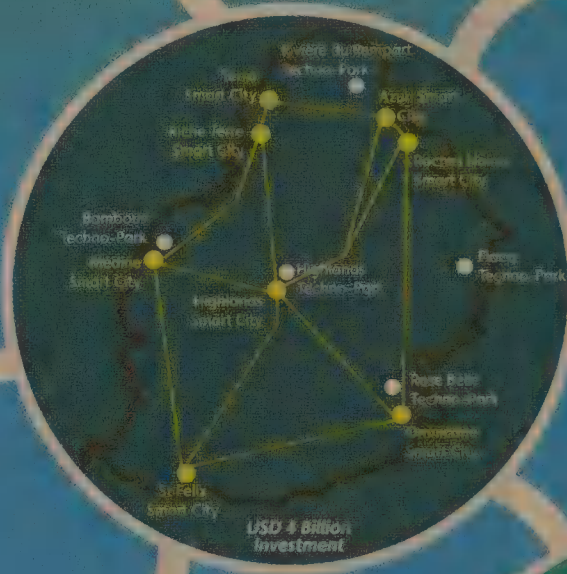
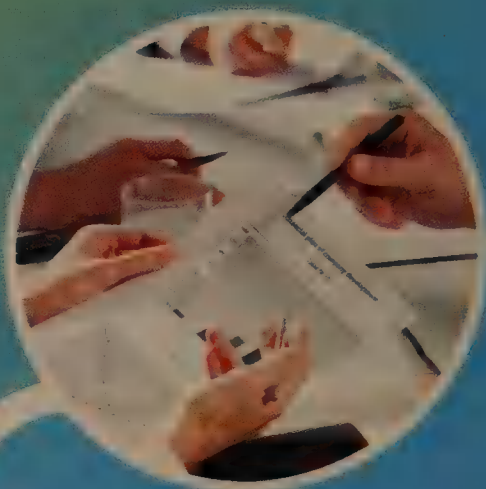
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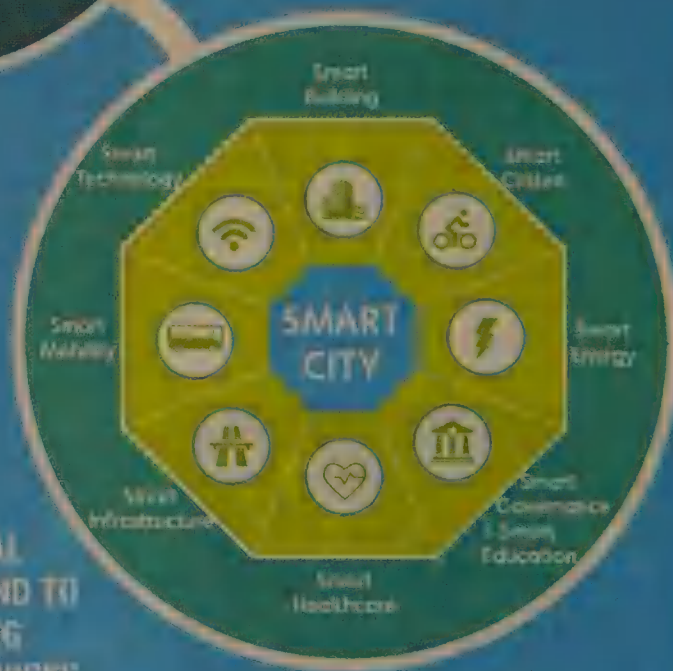


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Barrelling forward: Corsair cofounders Andrew Webber and Darek Bell are expanding beyond spirits into wine.

The Whiskey Rebels

With an arsenal of alt whiskeys and other small-batch spirits, Nashville's Corsair Distillery is disrupting and elevating the craft of craft distilling.

BY ABRAM BROWN

For all the barrels of craft liquor being produced in America, so much of it tastes the same. Crisp but relatively flavorless gins crowd bar shelves next to atomic whiskeys as pleasant as molten lava and rows of bourbons hitting the same caramel notes. So it is a great source of relief to discover Darek Bell and Andrew Webber, cofound-

ers of Corsair Distillery, sitting in a shacklike structure on the outskirts of Nashville, Tenn. with enough imaginative bottles in front of them to fuel a hearty bender.

Webber and Bell, both bearded and boldly attired—Webber in a floral-print shirt and whitewashed jeans, Bell in a blue striped suit and flowering handkerchief—have made peculiarity the defining characteristic of Corsair spirits. It's what pushed them to create Triple Smoke (made with Scottish peat and American cherry and German beech woods), their first whiskey and still their bestseller. The duo is now trying to unleash another blend with the same amount of originality. As Bell explained a few minutes earlier: "Our ethos is, If it's been done before, we don't want to do it."

They pour six 100-proof single-malt whiskeys into tulip-shaped glasses, calling out what they taste as they sample each one. The first is an unsmoked single malt ("Grape-Nuts cereal," says Bell), then five malts smoked, respectively, with hickory ("Like a barbecue," declares Webber), maple, pecan ("Floral, lighter and a nutty finish," he continues), apple and finally black walnut, an acrid mouthful. "You wouldn't want that to be the only thing in a bottle," Webber explains. "But it'd be a very good one to build a multismoke whiskey on because it provides a deep background."

It's a whiskey that many distillers might pour straight down the drain, though it's perfectly in character for Bell, 41, and Webber, 41, to admire it. Seven years into the launch of Corsair the two rebels are still gleefully flaunting every alcohol convention they can—from creating a quinoa whiskey and a barrel-aged gin to hiring a woman as their head distiller. Today Corsair spirits are available in 39 states and seven countries for about \$50 a bottle and have a passionate following, selling roughly 14,000 cases a year, up from, well, nothing a few years ago. They have also piled up awards, including gold and silver medals from the closely watched Wizards of Whisky industry event—most notably its American Craft Distiller of the Year in 2014.

Corsair's creation occurred in a place



Thinking outside the bottle: Corsair's roster of imaginative craft spirits includes quinoa whiskey and red absinthe.

where many entrepreneurial recipes are first concocted: the garage. In this case, the one attached to Bell's suburban Nashville home, in which he and Webber brewed beer before moving on to moonshining. In 2008, after a few successful experiments and failed pitches to investors, they broke out their credit cards and opened a distillery in nearby Bowling Green, Ky., because it was illegal to operate one commercially in Nashville. They soon released a well-received red absinthe (ruby-hued and floral-tasting after adding red hibiscus) and a gin made with classic botanicals such as juniper and coriander suspended in a basket above the still rather than directly steeping them.

While many artisanal brands have tried to imbue their products with a sense of advanced age—often connecting them to a purportedly ancient family recipe—Corsair's guiding spirit has been unabashed youthfulness. For their label they chose an image of three black-suited dudes. (Webber and Bell leave it to interpretation as to whether the photo evokes the Rat Pack, the Blues Brothers or *Reservoir Dogs*.) In 2010, following a legislative change, they finally opened a second distillery in Nashville, now the center of Corsair's whiskeymaking. They also rapidly

promoted Andrea Clodfelter, 28, from a bartender in the tasting room to the site's head distiller. This summer Corsair will open its fifth facility, giving it more than 5,000 gallons of still capacity (up from 50 gallons in 2008). Bell and Webber also plan to expand into brandy and wine with some vineyards.

With almost teenage impatience, Corsair wanted neither to wait to age its whiskey (though a whiskey's status, and taste, usually strengthen with time) nor to focus on a single product. A Corsair whiskey is almost always a year old or less with no age statement on the bottle. (Ever confident,

Bell proclaims: "If you want an aged whiskey, I'll tell you my favorite.") Not waiting enables Corsair to release a lot of whiskeys quickly, and in addition to Triple Smoke it has debuted such unusual recipes as Oat-rage (which tastes like a mouthful of Honey Nut Cheerios), Hopmonster (reminiscent of Belgian Tripels and American IPAs) and Quinoa Whiskey (nutty with a peppery finish). These are whiskeys made for an adventurous drinker, not a brown liquor beginner.

The most important recent addition to the Corsair family is not found in a bottle—it's the 300 acres of farmland Bell inherited from his father on the winding, heron-filled banks of the Cumberland River about 15 minutes from downtown Nashville. Corsair has already built a malting facility on the plot and plans to grow grain on it, too. Using the property is immensely practical—going grain-to-glass reduces the likelihood of an inflamed pressure point in Corsair's supply chain—but it's hard not to look at the land more symbolically, as yet another way for Webber and Bell to separate themselves creatively. "We don't have a board," Bell says proudly. "We don't have outside investors. There's no power struggle. If we want to make a crazy whiskey, we can just do it." ✱

FINAL THOUGHT

✱ "There is no bad whiskey. There are only some whiskeys that aren't as good as others." —RAYMOND CHANDLER

TRENDING

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PERSON

RANDALL GRAHM

The founder of Bonny Doon Vineyard has a new mission: creating the first New World Grand Cru. He's seeking \$150,000 in crowdfunding to grow 10,000 new grape varieties on his Popelouchum Estate in California.

COMPANY

RITZ-CARLTON

Its Kyoto property now offers authentic Japanese activities, including a "Samurai Experience" in which guests learn the art of *kenbu*, the "sword dance."



IDEA

VATICAN FOR SALE

To raise money for the poor, Pope Francis has been opening the Vatican to high rollers. Porsche rented the Sistine Chapel for an event, Justin Bieber paid handsomely for a papal audience and now wealthy investors can buy copies of items from the church's archives—for an ungodly sum.

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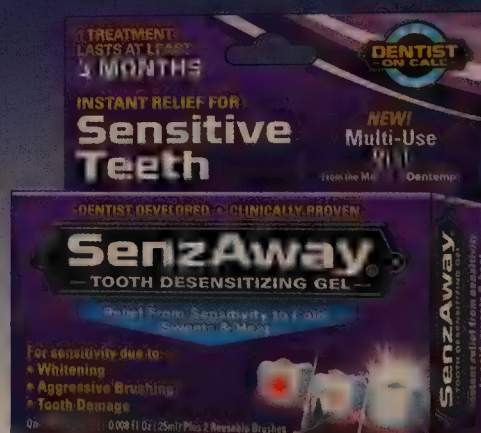
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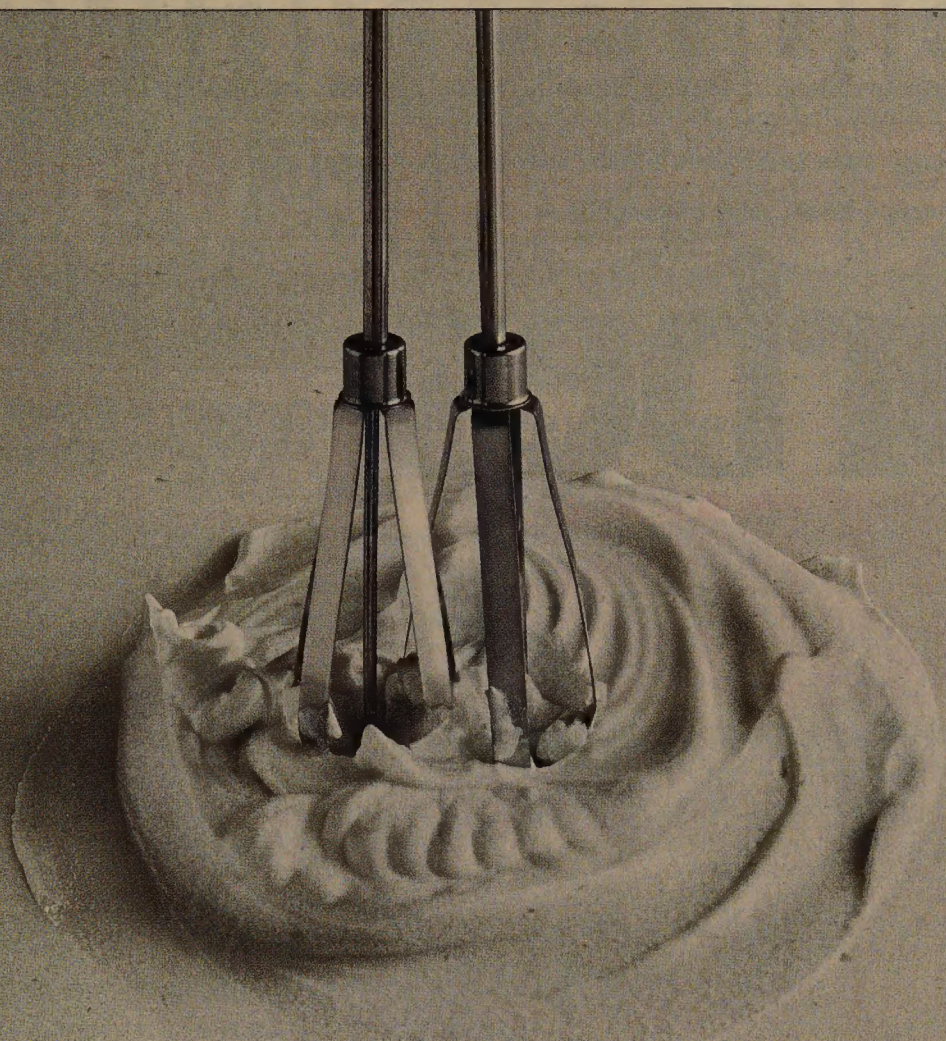
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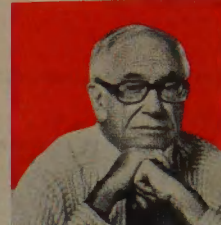
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—FROM THE MAR. 13, 1995 ISSUE OF FORBES

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TAMPA BAY BUCKS "Even most avid readers of the business sheets probably never heard of Malcolm Glazer before this January. He emerged from obscurity when he outbid six other investor groups to buy the Tampa Bay Buccaneers. Price: \$192 million, a sports franchise record."

ON MACHINES

"Never trust a computer you can't throw out a window." —STEVE WOZNIAK

"Technology is the knack for so arranging the world that we do not experience it." —MAX FRISCH

"Why is it that drug addicts and computer aficionados are both called users?" —CLIFFORD STOLL

"We are stuck with technology when all we really want is just stuff that works." —DOUGLAS ADAMS

"If it keeps up, man will atrophy all his limbs but the push-button finger." —FRANK LLOYD WRIGHT

"Behold, the days are coming," says the Lord, 'when the plowman shall overtake the reaper.'"
—AMOS 9:13

"The machine threatens all achievement."
—RAINIER MARIA RILKE

"The real question is not whether machines think but whether men do." —B.F. SKINNER

"I know there's a proverb that says 'To err is human,' but a human error is nothing to what a computer can do if it tries." —AGATHA CHRISTIE

"I could make tools if I had tools to make them with." —ELI WHITNEY

"The test of the machine is the satisfaction it gives you. There isn't any other test."
—ROBERT M. PIRSIG

"Technological progress has merely provided us with more efficient means of going backward."
—ALDOUS HUXLEY

"Computers are useless. They can only give you answers." —PABLO PICASSO

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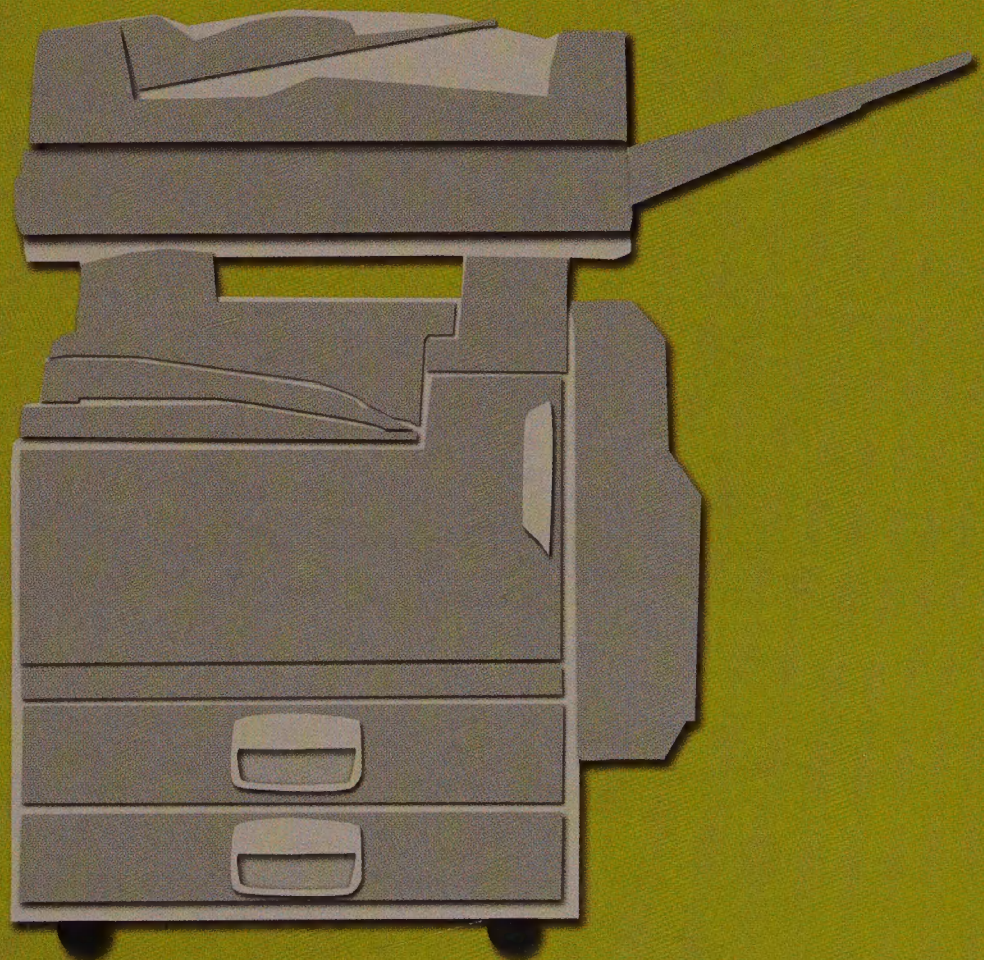
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